CONTRIBUTIONS TO THE KNOWLEDGE OF SOUTH AFRICAN MARINE MOLLUSCA. PART II. GASTROPODA: PROSOBRANCHIATA: RHACHIGLOSSA*

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(With 52 figures in the text)

RHACHIGLOSSA

Fam. *MARGINELLIDAE*

1917. Tomlin. *Proc. Mal. Soc.*, xii, pp. 242–306 (list of Recent species).
1925. Thiele. *D. Tiefsee Exp.*, xvii, pp. 191–7.
1932. Turton. *Mar. Sh. Port Alfred*, pp. 33–44.

A large number of specimens, fresh and worn, have been retrieved from the P.F. bottom-samples. Most of these have been identified; the remainder may be useful when a thorough study of South African Marginellas is undertaken.

The *Pieter Faure* did not obtain all the species described by Thiele from the *Valdivia* collection.

In this work only those species are mentioned for which additional records extend the hitherto known distribution.

Tomlin (p. 246) credits 43 species to the 'Cape' (South African) region. In later years he added four more species. All of these seem to be well established, though I have suggested (*infra*) that *taylori* renamed *barnardi* is a synonym of *differens*.

Thiele added 12 species, but I cannot admit the validity of all of these.

Turton listed 79 names of 'species and varieties' found by him at Port Alfred. Many of these are obviously additional names applied to known species and juveniles.

About 60 species might be a fair estimate of the number of South African Marginellas.

The size of apparently mature examples of the same species sometimes varies considerably: e.g. *musica* (with fully developed outer lip) from 15 to 25 mm. Tomlin has no comment on this feature, but he mentions that sinistrorsity occurs more frequently in this family than in other marine Gastropods (p. 246). I have not seen one such example, though some species (e.g. *biannulata*) are often found in hundreds in private collections.

* Part I. Toxoglossa: *Ann. S. Afr. Mus.*, vol. xliv, part 4, 1958.

The presence or absence of denticles (plicae) within the outer lip is usually easily seen, but the lip margin is much exposed to wear and often appears smooth. This may explain Smith's statement that the lip is either smooth or minutely denticulate in *dulcis* (= *bensoni*).

The radulae of only two species have been obtained: *capensis* and *biannulata*. There was no difficulty in finding the radulae of these two; but examples of *rosea*, *bairstowi* and *musica* were examined without success. Evidently the radulae of these species are very small and only to be found by a more refined technique than is usually employed. Tomlin (p. 245) quotes Gwatkin as saying that the radula of Marginellas is 'extremely hard to extract' but whether the difficulty is due to minute size is not stated. Fresh material is necessary, as animals long preserved in formalin or alcohol are not easily dissected.

For '*Marginella*' *angustata* Sow. (Smith, 1906, *Ann. Natal Mus.*, i, p. 28), see *Ancilla errorum* Tomlin.

Egg-capsules. Twelve egg-capsules affixed to a *Clavatula tripartita* from 31° 38′ S. 29° 34′ E. (off Port St. Johns), 26 fathoms (U.C.T. 1958).

Nearly hemispherical, maj. and min. diam. 4 and 3, height 2 mm.

Only one protoconch in each capsule. $2\frac{1}{2}$ whorls, alt. 2·5, diam. 2 mm. White, with on the last half or three-quarter whorl a blackish-grey band, more or less broken up into spots, at the suture with previous whorl. Columella pleats 4.

A 45 mm. *nebulosa* Bolten (S. Afr. Mus. no. A6382) has a similar dark stripe on the 1st postnatal whorl, but not on the protoconch (if there was one, it has been obscured by the surface glaze).

The protoconchs of *bicatenata* and *mosaica* also seem to be of a suitable size, but the juveniles (*v. infra*, pp. 5, 6) show no trace of a dark band at the *top* of the whorl near the suture.

M. piperata also is not excluded as a possible parent of these capsules, but no unworn examples are available.

Marginella munda Smith

1904. Smith. *J. Malac.*, xi, p. 31, pl. 2, fig. 14.

Off Illovo River (Natal), 27–30 fathoms, one worn and broken; off Cove Rock (East London area), 22 fathoms, two worn (S. Afr. Mus. P.F. coll.).

Marginella aphanospira Tomlin

1913. Tomlin. *J. Conch.*, xiv, p. 101 text-fig.

The type was described as having two columella pleats. The specimen seen and referred to by Tomlin (p. 102) has 3 pleats. The 3rd pleat can only be seen when the shell is viewed obliquely from below (except in immature examples where it is fully exposed). A Still Bay example has 3 and a feeble 4th pleat.

Port Elizabeth (seen by Tomlin) and Still Bay (S. Afr. Mus.).

Off Umkomaas River (Natal), 40 fathoms, 2; off Sandy Point (north of Cape Morgan), 51 fathoms, 2; off Cape Morgan, 33 fathoms, one; off Hood Point (East London area), 49 fathoms, 2; 34° 5′ S., 25° 55′ E., 67 fathoms, one immature; 34° S. 25° 44′ E., depth ?, 2 (S. Afr. Mus. P.F. coll.).

Marginella capensis Krauss

Fig. 1(*d*)

1848. Krauss. *Südafrik. Moll.*, p. 25, pl. 6, fig. 21.
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), pp. 34, 49.

When collected alive the shell is fawn coloured, the sutures marked by a narrow white band, outer lip and anterior portion of the columella white.

Radula with 46–56 rows, the denticles variable and asymmetrical on either side of the median line: see fig. 1*d*.

Seven specimens from 34° 27′ S. 25° 42′ E., 256 fathoms, were identified by Sowerby as this species, although the largest one measures only 9 × 4·3 mm. In shape they resemble *fallax* more than typical *capensis*, but there are only 4 columella pleats and no trace of denticulations within the outer lip. They probably represent another species, but for the present may be recorded here.

Marginella perla Marrat

Fig. 1(*a*)

1852. Krauss. *Arch. Naturg.*, i, p. 37 (*biplicata*, preocc.).
1876. Marrat. *J. Conch.*, i, p. 136.
1886. Watson. *Challenger Rep.*, xv, p. 267, pl. 16, fig. 8 (*chrysea*).
1903.* Von Martens. *D. Tiefsee Exp.*, vii, pl. 3, fig. 6 (Krauss's type) (not the recorded specimen = *brocktoni*).
1932. Turton. loc. cit., p. 36, pl. 7, no. 272 (*innocens*).

A curious feature of this species is the retention of previous lip varices on the outer surface. This is referred to by Watson, but not shown in his figure. It appears, however, in von Martens's figure of Krauss's type. It occurs in all the specimens I have seen, and may be regarded as a diagnostic character. Sometimes it gives an almost turreted appearance to the spire.

Watson gave the number of columella pleats as 3, but the 3rd (uppermost) is scarcely a pleat: 'only the end of the columella surface before the second pleat' (von Martens).

Sea Point, Cape Town (Watson); St. James (False Bay), and Still Bay (S. Afr. Mus.); Port Elizabeth (Sowerby); Port Alfred (Turton).

* In Part I the date of this paper was quoted as 1904, because it was received at the British Museum Library in February 1904, and was also noticed in *Naturae Novitates* in the same month. I have since found, however, that the original cover of Lief. 1 of vol. vii is dated 1903. Von Martens's paper is also entered in the 1903 Zoological Record.

The exact month of publication of von Martens's paper is sometimes important to decide priority, e.g. *Nassa analogica* Sow., 8 July 1903, *N. circumtexta* von Martens, 18 Dec. 1903.

Marginella lucida Marrat

1877. Marrat. *J. Conch.*, i, p. 205.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 39, pl. 1, fig. 2 (*turtoni*).

Off Tugela River (Natal-Zululand), 47 fathoms, one; off Illovo River (Natal), 27–30 fathoms, 3; off Umkomaas River (Natal), 40 fathoms, one; off Cape Morgan, 47 fathoms, 4; off East London, 20 fathoms, one; off Cove Rock (East London area), 22 fathoms, 3 (S. Afr. Mus. P.F. coll.). 30° 47′ S. 30° 29′ E., 24 fathoms (U.C.T.).

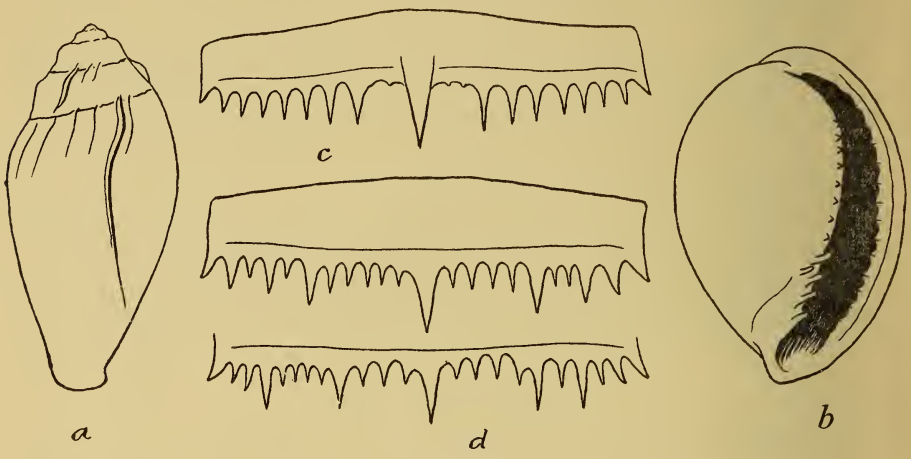


Fig. 1.

(*a*) *Marginella perla* Marrat. (*b*) *M. perminima* Sow. (*c*) radula plate of *M. biannulata* (Fabr.). (*d*) radula plates from two individuals of *M. capensis* Krss. to show variation.

Marginella biannulata (Fabr.)

Fig. 1(*c*)

1826. Fabricius. *K. Dansk. Vid. Selsk. Skr.*, ii, p. 57.
1841. Kiener. *Coq. Viv. Marginella*, p. 41, pl. 13, fig. 4 (*zonata*, preocc.).
1848. Krauss. *Südafrik. Moll.*, p. 126, pl. 6, fig. 22 (*bilineata*).

Radula large for the size of the animal: 1·5 × 0·3 mm. in shell 6 mm. long; 60 rows, median tooth largest, flanked by 8–9 smaller teeth and 1–2 denticles on either side.

Off Tugela River (Natal-Zululand), 47 fathoms, one; off East London, 20 fathoms, 2; off Cove Rock (East London area), 22 fathoms, 2; off Keiskamma Point, 33 fathoms, one (S. Afr. Mus. P.F. coll.).

Marginella adela Thiele

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 36 (not the fig. = *multizonata* = *cylindrica*).
1925. Thiele. loc. cit., p. 192, pl. 33 (21), fig. 23.

35° 16′ S. 22° 26′ E., 155 metres (Sta. 104, corrected by Thiele, instead of Sta. 114 von Martens).

Off Cape Natal (Durban), 54 fathoms, 3; off Hood Point (East London area), 5; 33° 3′ S. 27° 57′ E., 32 fathoms, 5; 34° 26′ S. 25° 42′ E., 125 fathoms, several; off Cape St. Blaize, 125 fathoms, several (S. Afr. Mus. P.F. coll.).

The above P.F. specimens seem referable to Thiele's species. None of them show the four colour bands distinctly, though in two or three of them there are traces of 1–2 bands.

Marginella musica Hinds

1844. Hinds. *Proc. Zool. Soc. Lond.*, p. 73.
1844. id. *Zool. Voy. Sulphur. Moll.*, p. 44, pl. 13, figs. 8, 9.
1848. Adams & Reeve. *Zool. Voy. Samarang.*, p. 28, pl. 7, figs. 4*a–c*, coloured (*diadochus*).
1886. Watson. *Challenger Rep.*, xv, p. 265.
1903. Smith. *Proc. Mal. Soc.*, v, p. 364 (*diadochus*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 33 (*diadochus*).
1917. Tomlin. loc. cit., p. 263 (*diadochus*) and p. 283 (*musica*).
1925. Thiele. loc. cit., p. 194.

Cream, pale buff or grey, with narrow dark grey spiral lines varying in number on last whorl from 5–13 (on base, i.e. length of aperture, varying from 4–10). Mature examples 15 to 25 mm. long. Foot and mantle pale pink with crimson radiating stripes (Adams & Reeve, fig. 4*a*).

35° 4′ S. 18° 37′ E., 150 fathoms (Watson); 33° 41′ S. 18° E., 178 metres; 34° 33′ S. 18° 21′ E., 318 metres; and 35° 16′ S. 22° 16′ E., 155 metres (von Martens); St. Francis Bay (Thiele).

Off Cape Recife, 56–124 fathoms, Agulhas Bank and around Cape Point to the Saldanha Bay area, 30–230 fathoms, one station in False Bay 14 fathoms (S. Afr. Mus. P.F. coll.).

Living: Simon's Bay (von Martens); False Bay (U.C.T.), 35° S. 20° 49′ E., 91 metres (s.s. *Africana*, per U.C.T.); Saldanha Bay area, 55 and 100 fathoms; off Cape Point 145 and 230 fathoms; and Agulhas Bank, 45 fathoms (P.F. coll.).

Remarks. A characteristic and abundant species.

The largest specimen is 25 × 12·5 mm. (off Cape Point, 85 fathoms); the smallest examples 5 × 3 mm., 4 × 2·5 mm., and 3 × 2 mm.; the two former have resp. $2\frac{1}{2}$ and $2\frac{1}{3}$ whorls, the latter has 2 whorls; all have 4 spiral lines on last whorl.

There are plump and slender forms: 11·5 × 7·5 mm. and 11·5 × 6 mm., 22·5 × 12 mm. and 22·5 × 10·5 mm.; both these slender examples are from the Saldanha Bay area, but not all the examples from that area are slender.

The type locality for *musica* is Cape Blanco, that for *diadochus* is Sunda Strait. Watson said his Cape specimen had the more elongate form of *diadochus*, but united this species with *musica*. Smith was inclined to agree. Thiele regarded the Cape specimens as *musica*. Tomlin listed them as separate species. Dautzenberg (1910, 1912) does not record *musica* from West Africa, but Knudsen does (1956. *Atlantide Rep.*, 4, p. 91, pl. 2, fig. 17).

The West African *eveleighi* Tomlin & Shackleford (1913. *J. Conch.*, xiv, p. 11, pl. 1, figs. 5 and 6) strongly resembles specimens of this species with numerous dark lines, especially Knudsen's figure (1956. *Atlantide Rep.*, 4, p. 84, pl. 3, fig. 2).

Turton's *fulvocincta* may be a synonym, but is more likely to be a variation of *piperata*.

Marginella mosaica Sow.

1846. Sowerby. *Thes. Conch.*, i, p. 381, pl. 75, figs. 58, 59.
1892. id. *Mar. Sh. S. Afr.*, p. 19 (var. *langleyi*).

A juvenile consisting of $2\frac{1}{4}$ whorls, 4 × 2·5 mm., has one series of orange dots above the shoulder, and 5 or 6 series below. It is relatively narrower than the juveniles of *bicatenata*.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton).

Off East London, 43 fathoms, one dead; off Nieca River (S. of East London), 43–50 fathoms, one dead and one juv.; off Stalwart Point (N. of Great Fish Point), 53 fathoms, one dead (S. Afr. Mus. P.F. coll.).

Marginella bicatenata Sow.

1914. Sowerby. *Ann. Mag. Nat. Hist.* (8), xiv, p. 477, pl. 19, fig. 7.
1916. Shackleford. *Ann. S. Afr. Mus.*, xiii, p. 193, text-figs. 1, 2 (*tomlini*).

Creamy-white, body whorl with 2 rows of dark grey spots, one row around the shoulder, and is visible also on the two preceding whorls of the spire, the other row starting from the uppermost columella pleat.

Cape St. Blaize, N. × E.$\frac{1}{2}$E., 68 miles, 105 fathoms (Shackleford); Cape St. Blaize, N. × E., 73 miles, 125 fathoms, one juv.; off Umkomaas River (Natal), 40 fathoms, two juv. (S. Afr. Mus. P.F. coll.).

Remarks. The original locality was given as Goree (West Africa) with a query; but possibly the specimen came from the P.F. collection sent to Sowerby.

The juveniles are 3·3 × 2·5 mm. with 2 whorls, 5 × 3·5 mm. with $2\frac{1}{2}$ whorls, and 5·5 × 3·75 mm. with 3 whorls; apex very blunt, rounded, angle *c.* 100°; body whorl white with the distinctive 2 rows of spots, but faded. The smaller juvenile is from the Natal locality.

A larger specimen, 22 × 11 mm., may be referable to this species. The spire is higher, angle *c.* 60°, and the 4th and 5th whorls are irregularly and shallowly fluted axially. Two rows of very faded spots can just be traced in the same position as in the type of *tomlini*. P.F. coll., but no precise locality (S. Afr. Mus. no. A 8776).

Marginella brocktoni Shackleford

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 37 (*chrysea*, non Watson; not the fig. = *perla*).
1914. Shackleford. *Ann. S. Afr. Mus.*, xiii, p. 98, 2 text-figs.
1925. Thiele. loc. cit., p. 193 (correction to von Martens).

34° 33′ S. 18° 21′ E., 318 metres (von Martens). Cape Point, N. 50° E., 180 fathoms, two (Shackleford).

The *Pieter Faure* obtained no other examples of this species.

Marginella augusta Thiele

1925. Thiele. loc. cit., p. 193, pl. 33 (21), fig. 28.

35° 11′ S. 23° 2′ E., 500 metres (Thiele). One specimen, 17 × 6·5 mm. (outer lip broken), without precise locality (S. Afr. Mus. P.F. coll.).

Remarks. Thiele's figure shows 4 columella pleats, but in his description he does not reckon the anterior fold of the columella as a pleat.

Very like *brocktoni*, but with 4 columella pleats.

Marginella neglecta Sow.

1846. Sowerby. *Thes. Conch.*, i, p. 390, pl. 76, figs. 135, 136.
1852. Krauss. *Arch. Naturg.*, i, p. 38 (*reevei*).
1853. Gaskoin. *Ann. Mag. Nat. Hist.* (2), xi, p. 359 (*rufula*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, pl. 3, fig. 3 (*reevei*) (not the specimens = *clara*).
1917. Tomlin. loc. cit., p. 283 (*neglecta*), p. 294 (*reevei*), p. 295 (*rufula*).

No specimens definitely referable to this species were obtained by the *Pieter Faure*.

Marginella clara Thiele

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 35 (not the fig. = *reevei* = *neglecta*).
1925. Thiele. loc. cit., p. 192, pl. 33 (21), figs. 21, 22.

35° 16′ S. 22° 26′ E., 155 metres (von Martens, Thiele).

Very like *neglecta*, or possibly a not fully mature *atractus*.

Marginella bensoni Rve.

1865. Reeve. *Conch. Icon.*, pl. 27, fig. 158.
1904. Smith. *J. Malac.*, xi, p. 32, pl. 2, fig. 20 (*dulcis*).
? 1925. Thiele. loc. cit., p. 195, pl. 33 (21), figs. 35, 36 (*laetitia*).

A faint spiral band below the suture and another on lower part of base (Thiele). Thiele said his species was near *adela*, but smaller. It certainly seems near *bensoni*.

35° 16′ S. 22° 26′ E., 155 metres (Thiele).

P.F. specimens from the following localities seem referable to *bensoni*; they are smaller than Thiele's specimens.

Off Umkomaas River (Natal), 40 fathoms; off Cape Morgan, 47 fathoms; 34° 5′ S. 25° 55′ E., 67 fathoms; False Bay, 22 fathoms (S. Afr. Mus. P.F. coll.).

Marginella differens Smith

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 20 (*bulbosa*, non Reeve).
1904. Smith. *J. Malac.*, xi, p. 32, pl. 2, fig. 19.
1916. Shackleford. *Ann. S. Afr. Mus.*, xiii, p. 194, text-figs. 3, 4 (*taylori*, non Olsson).
1919. Tomlin. *Proc. Mal. Soc.*, xiii, p. 65 (*barnardi*, nom. nov. for *taylori*, preocc.).

The type and cotype of *taylori* in S. Afr. Mus. do not seem distinguishable from other specimens identified by Shackleford as *differens*.

differens forma *eugenes* n.

Shape of *differens*, but larger and slightly less obese. 4 whorls. Columella pleats 4 with traces of 1–4 additional pleats posteriorly. Outer lip not reaching suture above, scarcely shouldered, not varicoid, internally with 18–20 well-developed denticulations or plicae, slightly inflected at upper end, aperture indented anteriorly. 7·5 × 4·8 mm. (Type), another 8 × 5 mm. Uniform pale buff.

Off Cape Natal (Durban), 85 fathoms, one; off Umkomaas River (Natal), 40 fathoms, one; 34° 27′ S. 25° 42′ E., 256 fathoms, 5; 34° 26′ S. 25° 42′ E., 124 fathoms, 6; Gericke Point (Knysna area), 42 fathoms, one; off Cape St. Blaize, 37 fathoms, 2; the same, 125 fathoms, 11; off Cape Infanta, 46 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. The 8 × 5 mm. specimen from off Gericke Point was seen by Tomlin and Shackleford, and considered to be a n. sp. but 'too poor' for description. Actually it seems in quite fair condition, though the surface is not glossy. Therefore the glossy, but slightly smaller, specimen from off Umkomaas River is taken as the type (S. Afr. Mus. no. A8786) of this large form.

Only further research will show whether a name is really necessary; the difference in size between this form and normal *differens* (5–8 mm.) is no greater than that found in *musica* (15–25 mm.).

Marginella burnupi Sow.

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 10, pl. 6, fig. 35.
1929. Dautzenberg. *Faune Col. Franc.*, III, 4, p. 381.
1932. Turton. *Mar. Sh. Port Alfred*, p. 42.
Not Thiele. 1925. loc. cit., p. 192, pl. 33 (21), figs. 24, 25.

Conical, widest slightly above middle, narrowing anteriorly, spire flat. Columella pleats 5 (Sowerby), 6–8 in larger specimen. Outer lip incrassate (when mature), internally plicate. 4 × 2 mm. (Sowerby); 5 × 3 mm.

Port Elizabeth (Sowerby); Port Alfred (Turton).

Algoa Bay, 67 fathoms, one, typical; off Glendower Beacon (Port Alfred area), 66 fathoms, one, with low spire (S. Afr. Mus. P.F. coll.).

Distribution. Madagascar (Dautzenberg *fide* Bavay).

Remarks. Of 4 worn specimens from Port Alfred (coll. Turton) one (immature) has a flat spire, the others have low spires, definite but not so high as in Thiele's figure.

Thiele had difficulty with *burnupi* and *dulcis* (= *bensoni*) owing to variability, and suggested that the plump and slender forms might possibly be the two sexes. Both his figures show rather high spires, quite unlike Sowerby's figure and the typical specimen recorded above; moreover, fig. 24 shows a denticulate lip (which is correct for *burnupi*), but fig. 25 shows a non-denticulate lip. Thiele's specimens came from Algoa Bay, Agulhas Bank, and St. Francis Bay; also from Great Fish Bay (Angola). I doubt whether any of these were really *burnupi*; they should be re-examined, especially the Angolan specimen.

M. almo Bartsch 1915 also has a low spire, but is ovoid in shape with the greatest width in the middle.

Marginella fallax Smith

1903. Smith. *Proc. Mal. Soc.*, v, p. 365, pl. 15, fig. 20.

Off East London, 32 fathoms, two; False Bay, 20 fathoms, 3 (S. Afr. Mus. P.F. coll.).

A worn specimen in S. Afr. Museum is said to have come from 'Natal', but the record is unreliable.

Marginella keenii Marrat

1871. Marrat. *Ann. Mag. Nat. Hist.* (4), vii, p. 141, pl. xi, fig. 13.
1925. Thiele. loc. cit., p. 194, pl. 33 (21), fig. 30 (*agulhasensis*).

35° 16′ S. 22° 26′ E., 155 metres (Thiele).

Cape Point N. 16° E., 10 miles, 85 fathoms, 2; off Glendower Beacon (Port Alfred area), 100 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. Not having seen Marrat's original description, I accept Tomlin and Shackleford's identification of the three P.F. specimens. They are clearly the same as Thiele's *agulhasensis*.

The 2 Cape Point specimens (13 × 7 mm.) have 3 columella pleats, one of them with an additional indistinct one as shown in Thiele's figure; the Glendower Beacon specimen has 4 well-defined pleats. The latter is somewhat worn, and hence proportionately broader (11 × 7 mm.).

Marginella shepstonensis Smith

1906. Smith. *Ann. Natal Mus.*, i, p. 31, pl. 7, fig. 5.

Wavy or zigzag brown axial lines, thickened in two or three places so as to form 2 or 3 spiral bands of crescentic marks, one in the middle and one towards each end of the body whorl.

Off Tugela River (Natal-Zululand), 47 fathoms, one; off Illovo River (Natal), 27–30 fathoms, 2; off Umkomaas River (Natal) 40 fathoms, one (S. Afr. Mus. P.F. coll.).

Marginella kerochuta Shackleford

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 34 (not the fig. = *zeyheri*).
1914. Shackleford. *Ann. S. Afr. Mus.*, xiii, p. 97, 2 text-figs.
1925. Thiele. loc. cit., p. 191 (correction to von Martens).

Biconical, outer lip when mature forming a strongly projecting shoulder, spire (including shoulder) subtending an angle of 70° (type) to 90°. Mature 9 × 6 to 13 × 7 mm. (Thiele: long. 8–11 mm.).

34° 33′ S. 18° 21′ E., 318 metres (von Martens); 35° 16′ S. 22° 26′ E., 155 metres (Thiele).

Off Cape Point, 135 fathoms (Shackleford).

36° 40′ S. 21° 26′ E., 200 fathoms, one fresh; off Cape St. Blaize, 125 fathoms, 6 worn; Brown's Bank (approx. 36½° S. 21° E.), 80–100 fathoms, one fresh, immature (S. Afr. Mus. P.F. coll.).

Remarks. Type and cotype in S. Afr. Mus. The type has the highest spire with angle 70°, the cotype with angle 80°; the specimen from southern end of Agulhas Bank with angle 80°, and the worn specimens with angles 85°–90°.

Closely related to *zeyheri*, but larger and from deeper water.

Marginella zeyheri Krauss

1852. Krauss. *Arch. Naturg.*, i, p. 38.
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 20 (*metcalfei*, non Angas).
1903. Von Martens. *D. Tiefsee Exp.*, vii, pl. 3, fig. 4 (Krauss type) (not the description = *kerochuta*).
1904. Smith. *J. Malac.*, xi, p. 31, pl. 2, fig. 18 (*pura*).
1917. Tomlin. loc. cit., p. 306, and p. 292 (*pura*).
1925. Thiele. loc. cit., p. 191 (correction to von Martens).
1925. id. ibid., p. 195, pl. 33 (21), figs. 33, 34 (*aurelia*).

Biconical, outer lip forming a strongly projecting shoulder, spire angle 70°. Mature: 5 × 3 to 7·5 × 4–4·5 mm.

Port Elizabeth (Sowerby); Port Alfred (Smith, Bartsch, Tomlin).

35° 16′ S. 22° 26′ E., 155 metres; 34° 8′ S. 24° 59′ E., 80 metres (Thiele).

Off Umkomaas River (Natal), 40 fathoms, 2; off Cape Morgan, 47 fathoms, 2; off Cove Rock (East London area), 22 fathoms, 5; off East London, 20 fathoms, 6 (S. Afr. Mus. P.F. coll.).

Remarks. Specimens in which the outer lip is worn smooth have the appearance of belonging to the non-denticulate section of the genus.

Marginella atractus Tomlin

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227 (*fusiformis*, non Hinds).
1918. Tomlin. *J. Conch.*, xv, p. 306, pl. 10, fig. 6.
1925. Thiele. loc. cit., p. 195, pl. 33 (21), figs. 31, 32 (*julia*).
1925. id. ibid., p. 195, pl. 34 (22), fig. 1 (*meta*).

Fusiform, outer lip when mature forming a well-marked shoulder, spire angle 50°. 3 × 1·5 mm. (2½ whorls); 4 × 1·75 mm. (3 whorls); mature: 5·5 × 2·5 mm. to 8 × 3·75 mm.

Nanquas Peak (eastern end of Algoa Bay), 49 fathoms (Sowerby); Port Elizabeth (Smith); Port Alfred (Tomlin, Turton); Still Bay (S. Afr. Mus. Muir coll.).

34° 51′ S. 19° 37′ E., 80 metres; 35° 16′ S. 22° 26′ E., 155 metres; 35° 29′ S. 21° 3′ E., 102 metres; and 35° 26′ S. 20° 56′ E., depth ? (Thiele).

Off East London and Cove Rock, 22–32 fathoms; off Keiskamma River and Great Fish Point; Algoa Bay 22–30 fathoms; off Cape Recife, 125 and 256 fathoms; off Cape St. Blaize, 125 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Judging by the numbers of specimens retrieved from the P.F. bottom-samples, this species seems concentrated chiefly in the East London to Algoa Bay area.

Over 100 examples have been examined. Comparatively few specimens show a definite lip denticulation; often it is traceable only in an oblique light; much depends on the condition of the specimen.

The proportions vary slightly, though the present material does not altogether support Turton's statement that the broader *zeyheri* and narrower *atractus* 'grade together' (beach specimens may do so!); I have found little difficulty in separating them and therefore maintain the two species. On the other hand the slight differences relied upon by Thiele for his species do not seem to justify additional species.

Marginella perminima Sow.

Fig. 1(*b*)

1894. Sowerby. *J. Conch.*, vii, p. 370.
1897. id. *Append. Mar. Sh. S. Afr.*, p. 9, pl. 6, fig. 36.
1932. Turton. loc. cit., p. 43 (referred to under *neptuni*).

Columella pleats 4 plus 7–8 tiny denticles.

Port Elizabeth (Turton).

Off Cape Natal (Durban), 54 fathoms, one; off Umkomaas River (Natal), 40 fathoms, one; off Sandy Point (N. of Cape Morgan), 51 fathoms, 2; off Cove Rock (East London area), 22 fathoms, 2; 33° 3′ S. 27° 27′ E., 32 fathoms, one; 34° 27′ S. 25° 42′ E., 56 fathoms, one; off Cape St. Blaize, 125 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. The original description is not available to me. Turton says the species has only 3 columella pleats. In some of the present specimens only 3 are clearly visible, the fourth and the additional denticles being seen only in the best specimens.

Fam. *CANCELLARIIDAE*

1903. Thiele *D. Tiefsee Exp.*, vii, p. 171 (*radula*).
1911. Schepman. *Siboga Exp. monogr.*, xlix, 1, p. 265 (radula) (line 18 for 'nearly' read 'neatly').
1955. Adam & Knudsen. *Bull. Inst. Roy. Sc. Nat. Belge*, xxxi, no. 61, p. 18 (radula).
1958. Barnard. *J. Conch.*, xxiv, p. 243 (radula).

Eight species have been known hitherto from South African waters. In the present paper one new species and one new record are added.

C. dalli Bartsch 1915 is known from a single specimen recorded as coming from the Cape of Good Hope. *C. plebeja* Thiele 1925 is known from two shells from the Agulhas Bank. The *Challenger* species *imbricata* Watson 1882 was rediscovered by the *Pieter Faure*, which also obtained the new species, but no examples of *plebeja*.

The most interesting discovery, however, was made by the Fisheries Survey vessel *Africana* off Lüderitzbucht, viz. a species which seems referable to the Italian Pliocene-Miocene *lyrata*. Specimens identified with this fossil species have already been recorded from off the Cape Verde Islands and the coast of northern Angola, in the latter locality living. The extension southward of the range of this species, indeed its presence in three localities off the west coast of Africa, raises very interesting zoogeographical questions.

In three species I have been able to make some observations on the remarkable radula of the genus *Cancellaria*. Unfortunately the condition of the material left no opportunity of investigating the myology.

The radula consists of a large number (at least 100) of very long slender teeth attached in single file to a basal membrane. The teeth are oriented in two groups: those attached to the shorter anterior portion of the membrane project forwards, the more numerous teeth on the posterior portion project backwards, and appear to be replacers.

The radula is enclosed in a double sheath (Barnard, loc. cit., fig.): a smaller inner one rather like the carapace of a bivalve Crustacean; the outer larger one has a pointed tubular anterior projection with a small apical opening. I have suggested that possibly this buccal apparatus operates by pushing the anterior teeth through the tubular opening of the outer sheath, which would hold the teeth firmly like the hairs in the collar of a paint-brush, and thus using them to sweep particles of food into the mouth. But the myology should be studied, and for this purpose fresh material is necessary.

Cancellaria imbricata Watson

Fig. 2

1882. Watson. *J. Linn. Soc. Lond.*, xvi, p. 325.
1886. id. *Challenger Rep.*, xv, p. 274, pl. 18, fig. 10.
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 230.
1958. Barnard. loc. cit., p. 244.

Protoconch (corroded) smooth, diam. 2 mm. Postnatal whorls 4; 1st with 3 spiral lirae, 2nd and following whorls with 4, crossed on 1st and 2nd, and sometimes part of 3rd whorl by feeble axial ribs, intersections slightly tuberculose. Growth-lines closely imbricate, retractively concave between each pair of spiral lirae. 10–12 additional lirae on base. 29 × 17 mm., a juv. 13 × 8 mm.

Radula with at least 100 extremely long slender filiform teeth set closely together in two divergent series on a narrow basal membrane; apex of each tooth truncate, obscurely denticulate, one of the margins near apex also obscurely denticulate. Length of basal membrane *c.* 1 mm., of each tooth *c.* 2 mm.

Shell dull white; animal (as preserved) greenish.

35° 4′ S. 18° 37′ E., 150 fathoms, green sand (Watson). Off Cape Point, 135–190 fathoms, green sand with black specks (S. Afr. Mus. P.F. coll.).

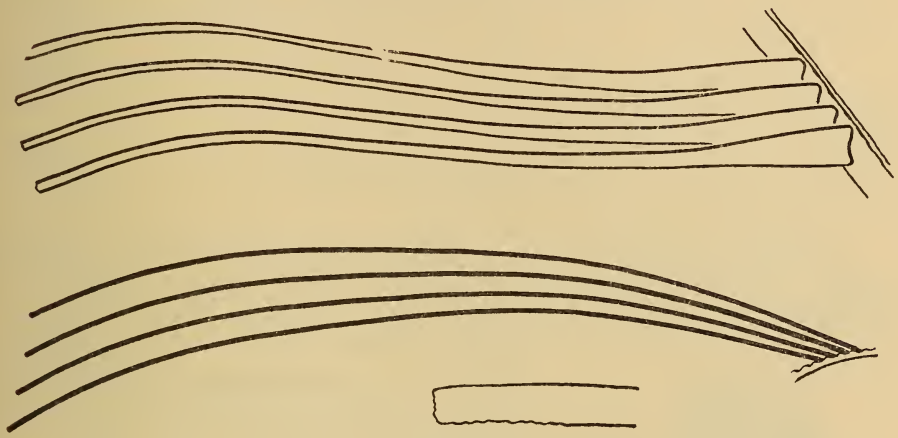


Fig. 2.

Cancellaria imbricata Watson, face (slightly oblique) and lateral views of radula plates on basal membrane, with apex of one plate further enlarged.

Remarks. The *Challenger* obtained one specimen; the *Pieter Faure* 14 specimens (including the one recorded by Sowerby); three were taken alive.

The apex of all the shells, including the juvenile of 13 mm., is more or less corroded.

Although Watson said the aspect of the shell suggested an *Admete*, the presence of a radula shows that he placed the species in the correct genus.

Cancellaria bifasciata Desh.

1859. Chenu. *Man. Conchyl.*, i, p. 277, fig. 1845.

Umbilicus narrowly open. Aperture longer than spire. Whorls rounded, suture deep, but visible laterally. Protoconch 2 whorls, smooth. Postnatal whorls $3\frac{1}{2}$; at first spirally lirate, then growth-lines becoming stronger and forming numerous axial riblets on 2nd and first part of 3rd whorl, producing a cancellate sculpture; but on body whorl becoming again subordinate to the spiral lirae; the latter *c.* 11 on body whorl, with a fine intermediary between each of the upper 3 or 4 pairs of main lirae; *c.* 16 additional lirae on base, very regularly arranged. Columella with 3 pleats. Aperture oval, no canal. 24 × 14 mm.

Pale buff with faint orange patches above and below a pale band slightly below middle of whorl.

Off Cape Natal (Durban), 47 fathoms, one complete; and 54 fathoms, three broken body whorls (S. Afr. Mus. P.F. coll.).

Remarks. The complete specimen described above was identified by Tomlin as *bifasciata* var., with the suggestion that further examples might show it to be a distinct species. As far as can be judged, it is exactly like Chenu's figure. It also corresponds with a figure of *elegans* Sow. (Reeve. *Conch. Icon.*, x, pl. 16, fig. 75) in Gravely (1942. *Bull. Madras Govt. Mus.*, n. s., V, 2, p. 68 (in key), fig. 12 *i*).

The broken body whorls agree in sculpture with the above described specimen.

Cancellaria euetrios n. sp.
Fig. 3

Umbilicus narrowly open. Aperture a little longer than spire. Whorls convex, without shoulder, suture deep, not quite visible in lateral view. Protoconch 1½ whorls, alt. 0·5 mm., diam 0·75 mm., smooth. Postnatal whorls 2, junction with protoconch not clearly defined but marked by 4–5 indistinct and incomplete axial ribs; 28 ribs on 1st, 30 on 2nd whorl; crossed by spiral lirae 9–10 on 1st, 11 on 2nd whorl, 11–12 additional lirae on base. Columella with 3 indistinct pleats. 4·5 × 2·5 mm.

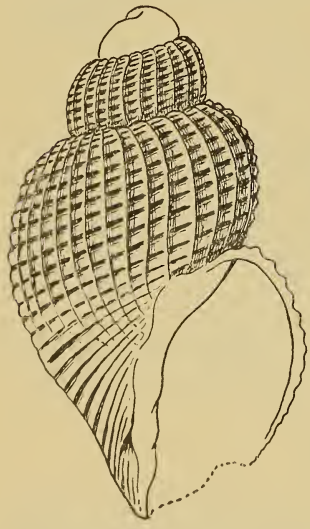


Fig. 3.
Cancellaria euetrios n. sp.

White beneath pale buff periostracum, protoconch white.

34° 26′ S. 25° 42′ E. (off Cape Recife), 124 fathoms, one (S. Afr. Mus. no. A8747. P.F. coll.).

Remarks. The size of the protoconch indicates a small species, but this specimen is probably not fully grown. The cancellate sculpture is very regular ('well-woven') though perhaps not more so than in some other species; the ribs are more prominent than the lirae.

Cancellaria producta Sow.

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 220, pl. 4, fig. 5.

Off Umhloti River (Natal), 40 fathoms, 2 specimens (Sowerby). Same locality, 2 and one broken; off Umhlanga River (Natal), 22–26 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. One of the two type specimens, agreeing with Sowerby's measurements, is in S. Afr. Museum; the other 'type' was probably in coll. Sowerby (? now Brit. Mus.).

Another specimen is broken and bored by *Cliona*, only the last $2\frac{1}{2}$ whorls remaining; it was a larger shell than the type: width 8 mm., with presumably long. *c.* 19 mm.

Cancellaria lamellosa Hinds

1843. Hinds. *Proc. Zool. Soc. Lond.*, p. 49.
1844. id. *Zool. Sulphur. Moll.*, p. 43, pl. 12, figs. 15, 16.
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 264.
1958. Barnard. loc. cit., p. 244.

Pale buff, a pinky-brown band at shoulder and another about in middle of body whorl, more distinctly visible inside the aperture. One of Burnup's Durban specimens is orange-brown, the bands visible only inside the aperture. The Delagoa Bay shell is very pale pink, with a few brown specks on the crest of each axial rib. Up to 18 × 13 mm. Animal (as preserved) flesh tint.

Radula similar to that of *imbricata*.

Agulhas Bank (Hinds). Off Umvoti, Umhloti, and Umhlanga Rivers (Natal), 22–40 fathoms (S. Afr. Mus. P.F. coll.). Durban (S. Afr. Mus. coll. Burnup).

Living: Delagoa Bay (U.W.).

Distribution. Ceylon, Straits of Malacca, East Indies.

Remarks. The largest specimen (as above) is from Delagoa Bay. The extent to which the umbilicus is covered by the columella callus is variable; and also depends on the angle from which the shell is viewed. This explains the words 'umbilico magno' in Hinds's description.

In Gravely (1942. *Bull. Madras Govt. Mus.*, n. s., V, 2, p. 68 (in key)) *lamellosa* is regarded as one of the varieties of *crispa* Sow.

Cancellaria foveolata Sow.

1848. Sowerby. *Thes. Conch.*, i, pl. 93, figs. 30, 31.
1932. Turton. *Mar. Sh. Port Alfred*, p. 30, pl. 6, no. 224.

Pale buff or amber to chestnut-brown, sometimes irregularly infuscate or with a brown band in middle of body whorl, brown spiral bands often visible inside aperture, protoconch white. 24 × 14 mm.

Natal to Jeffreys Bay (S. Afr. Mus.).

Remarks. Not taken by the *Pieter Faure*, and known only from beach material.

Cancellaria semidisjuncta Sow.

1848. Sowerby. *Proc. Zool. Soc. Lond.*, p. 137; and *Thes. Conch.*, i, pl. 95, figs. 62, 63.

18 × 14 mm.; width of a larger specimen 18 mm., apex broken but full length probably *c.* 25 mm.

East London to Jeffreys Bay (S. Afr. Mus.).

Remarks. Not taken by the *Pieter Faure*. A specimen in S. Afr. Mus., said to have come from Tanganyika, is very worn and has the coarse cancellate appearance of worn South African examples. Sowerby in his original description gave Philippine Islands as the locality, but Bartsch 1915 doubted this locality.

Cancellaria cf. *lyrata* (Brocchi)

Fig. 4

1814. Brocchi. *Conch. foss. subapenn.*, ii, p. 311, pl. 3, fig. 6 (*Voluta l.*) (quoted from D. & F.).
1820. Borson. *Mem. R. Ac. Sc. Torino*, xxv, p. 210 (quoted from Sherborn. Index Anim.).
1894. Sacco. *Moll. Terz.*, part 16, p. 59, pl. 3, figs. 57–65 (*Sveltia l.*) (quoted from D. & F.).
1906. Dautzenberg & Fischer. *Res. Sci. Camp. Monaco*, fasc. 32, p. 17, pl. 1, figs. 11–13 (Recent), figs. 14–16 (fossil).
1955. Adam & Knudsen. *Bull. Inst. Roy. Sc. nat. Belge*, xxxi, no. 61, p. 16, pl. 2, figs. 6, 7, and text-fig.
1958. Barnard. *J. Conch.*, xxiv, p. 243 (radula).

Specimen A.

Aperture very little longer than spire. Protoconch tip broken, remainder slightly corroded, diam. 1 mm. Postnatal whorls 5, profile of 2nd and 3rd slightly angular, of 4th and 5th sharply keeled in middle; 1st whorl corroded, 2nd partly corroded but with indications of 9 or 10 (possibly 11) axial ribs, 3rd with 12, 4th with 11, 5th with 9 ribs, from suture to suture and extending across base; ribs narrow, sharp, with acute points at intersections with the peripheral keel; crossed by spiral lirae, corroded on early whorls, at least a dozen fine and equal-sized above periphery on 4th and 5th whorls, below periphery 2 stronger main lirae and 2 weaker, with finer intermediaries; 6–7 additional lirae with intermediaries on base (total about 15); the main lirae form little prickles at intersections with the ribs. Columella with 3 pleats, columellar glaze not fully developed, thin and not obscuring the ribs and lirae on base. Umbilicus closed. Aperture wide, outer lip thin, not constricted below; canal short and wide. 35 × 24 mm. (incl. peripheral points, 19 mm. excl. these points).

Greyish-white, aperture yellowish-fawn.

Locality? (see Remarks, *infra*) (S. Afr. Mus. ex coll. P. Ross-Frames).

Specimen B.

Aperture a little longer than spire. Apex corroded. Remaining postnatal whorls 4, profile angular, last whorl with peripheral keel. Early whorls corroded, axial ribs 11 on each of the upper two whorls, 9 on last whorl, more or less tubercular at shoulder, but corroded; crossed on last whorl by spiral lirae (not traceable on preceding whorls), at least a dozen fine and equal-sized lirae above shoulder, and about a dozen below, 3 or 4 slightly stronger than the others, about 15 (partly corroded) additional lirae on base, varying in size.

Columella with 3 pleats, columellar glaze extensive, rather thick, the axial ribs and some of the lirae only indicated. Umbilicus closed. Aperture wide, outer lip thin, not constricted below; canal short and wide. 43 × 24 mm.

Dirty brownish-grey, aperture yellowish-brown, glaze whitish.

Radula and sheath: see Barnard, loc. cit., and remarks under genus.

26° 26′ S. 14° 39′ E., 174 metres (off Lüderitzbucht, South West Africa) (s.s. *Africana*, 1948, AFR. 1260 B. per U.C.T.).

Distribution (recent). Off Cape Verde Islands, 628 metres (Dautzenberg & Fischer); 5° 46′–6° 29′ S. 11° 32′–11° 38′ E., 145–230 metres (Adam & Knudsen).

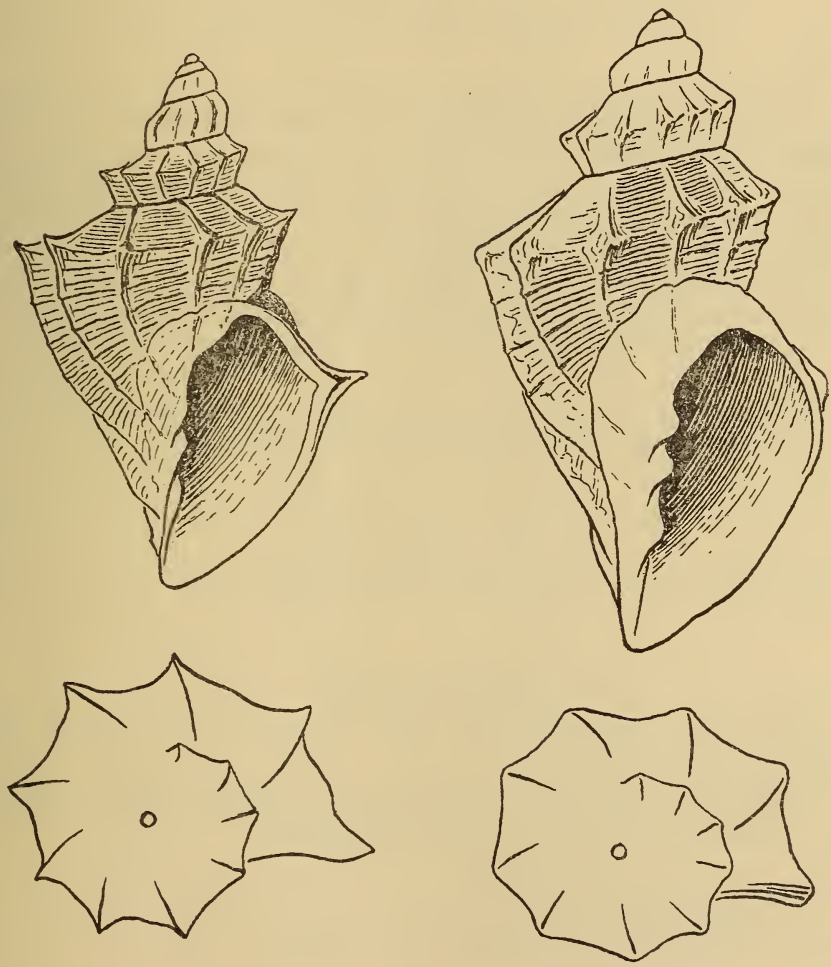


Fig. 4.

Cancellaria cf. *lyrata* (Brocchi). Specimen A on left, B on right; with diagrammatic apical views of last whorl.

Remarks. Unfortunately the provenance of the less corroded Ross-Frames specimen (A) is unknown. The late P. Ross-Frames collected many shells while serving in the military campaign in South West Africa in 1914–15 (cf. Burnup. 1923. *Ann. Natal Mus.*, V, p. 2), and in view of the larger living example (B) having been dredged off Lüderitzbucht, it is a reasonable assumption that he obtained his specimen, directly or through a friend, from somewhere in the same area.

The two specimens are obviously conspecific. The Ross-Frames specimen is the less corroded, and is much fresher-looking. It is slightly smaller, and the columellar glaze has not reached its full extent or thickness. It shows, however, that the remaining whorls on the rather badly corroded *Africana* specimen are actually the 1st to 5th postnatal whorls, not a corroded protoconch plus 4 whorls.

There is a striking resemblance between these shells, especially the *Africana* one, and the shell dredged off the Cape Verde Islands, which Dautzenberg & Fischer identified with the Italian Pliocene-Miocene *lyrata.* There is an even greater, in fact an exact resemblance to the specimens described and figured by Adam & Knudsen from off the northern part of the Angolan coast, and likewise referred to the same fossil species.

The fewer and more widely spaced axial ribs on the last whorl in both specimens A and B should be borne in mind in deciding the status, specific or variational, of the South West African form. The fossil form is known to be variable.

Cancellaria lyrata Ad. & Rve. (1850. *Zool. Samarang. Moll.*, p. 42) is probably not the same as *lyrata* (Brocchi), and if so requires renaming.

Fam. *VOLUTIDAE*

1901. Smith. *Proc. Mal. Soc.*, iv, p. 231 (synopsis of S. African species).
1922. Cooke. ibid., xv, p. 6 (radulae).

Gen. Voluta Linn.

Operculum present or absent. Columella with pleats. Radula with tricuspid central tooth only.

Of the five endemic South African species, the radulae of three are known, and one is definitely known to possess an operculum.

Spire high, pointed. With axial ribs.
- Columella callus black . . . . . *africana*
- Callus not black.
  - Pleats 3 plus 3 obscure ones . . . . . *ponsonbyi*
  - Pleats 5 . . . . . *queketti*

Spire low, blunt. No axial ribs.
- Pleats 2 . . . . . *bullata*
- Pleats 4 . . . . . *pringlei*

V. mitraeformis, *V. scapha*, and *Melo armata* were not admitted to the fauna-list by Smith (1901). I would also exclude *V. festiva*; if the young specimen recorded by Sowerby (1897) was really found on the Natal coast, it was far more probably an *africana* or a *ponsonbyi*.

Voluta africana Rve.

1856. Reeve. *Proc. Zool. Soc. Lond.*, p. 2, pl. 33, figs, 3, 4.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 31.
1913. Bullen Newton. *Rec. Albany Mus.*, ii, p. 342, pl. 24, figs, 1,2.
1922. Cooke. loc. cit., pp. 7, 10, fig. 3 (radula).
1932. Turton. *Mar. Sh. Port Alfred*, p. 44 and vars. *beckeri*, *ponderosa*, pl. 9, no. 327 (juv.), no. 328, and pl. 10, no. 329.
1933. id. *J. Conch.*, xix, p. 370 (*rietensis*, nom. nov. pro *ponderosa*, preocc.).

Spire high, pointed. Aperture $1\frac{2}{3}$–$1\frac{3}{4}$ times spire. Protoconch $2\frac{1}{2}$ whorls, diam. 4–4·5 mm. (3·5 mm. on an old worn specimen). Postnatal whorls 3. Axial ribs strongly tuberculate at shoulder (but usually abraded), extending below to base in juveniles (up to 16 mm.) but in large specimens becoming obsolete (except in vars. *beckeri* and *rietensis*), 16–18 on 1st whorl, 9–11–13 (sometimes 14) on last whorl; spiral striae over whole whorl, but usually obsolete on body whorl except in fresh specimens. Columella pleats 5, the upper 2 obscure. Outer lip in adult slightly thickened and ascending towards shoulder of preceding whorl. A well-marked columella callus. 67 × 39 mm.

An operculum 'presumably belonging' to a specimen of this species was described by Smith.

Pinky-brown, more or less speckled, speckles usually aggregated to form two more or less solid spiral bands, sometimes with large brown blotches; dark brown spiral lines may appear towards outer lip, but usually they are only visible on the thickened lip where they occur in pairs, threes, or fours; columella callus dark chestnut-brown (Smith: 'coal-black'). Juveniles with 4–5 narrow spiral bands on 1st whorl (or first and a half), continuous or broken into a series of spots (cf. Turton's fig. 327).

Radula with *c.* 54 rows (Cooke).

Fossil: Mio-Pliocene: Redhouse near Port Elizabeth (Newton).

East Africa (Reeve); South-east Africa (Sowerby); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Port St. Johns and Pondoland (Smith); off Durban, 40 fathoms (Smith); 35° 16′ S. 22° 26′ E., 155 metres, fragmentary lower half, 38 mm. long (von Martens). Natal, from fish stomachs, with var. *beckeri*; Port Alfred, juveniles and var. *rietensis* (S. Afr. Mus.).

Not taken by the *Pieter Faure*.

var. *beckeri* (Shackleford ined.) Turton. A narrow form with usually more numerous ribs (14) which extend to base, sometimes 2 ribs concurrent into one tubercle (e.g. 14 ribs, 10 tubercles), tubercles less prominent. Occurs in Natal along with the plump form.

var. *rietensis* Turton. A thicker-shelled, heavier form, with ribs extending to base. Maybe these shells are merely aged individuals. 68 × 45 mm. (badly

worn), 73 × 46 (apex and canal worn) (S. Afr. Mus.). Recorded only from Port Alfred.

Remarks. If the operculum described by Smith really belonged to this species, the species cannot be placed in the subgen. *Alcithoe.*

Both plump and slender forms occur: 38 × 21, 51 × 27, 52 × 27, 64 × 35, 64 × 37, 65 × 35, 67 × 39 mm.

S. Afr. Mus. has protoconchs and juveniles up to 16 mm., but no specimens between 16 and 38 mm. long.

Specimens with thickened outer lip (with dark lines) 38 and 42 mm. long.

Voluta ponsonbyi Smith

1901. Smith. loc. cit., p. 231, text-fig.
1922. Cooke. loc. cit., pp. 7, 10, fig. 4 (radula).

Spire high, pointed. Aperture 1½–1¾ times spire. Protoconch 2½ (3) whorls, diam. 2–2·5 mm. Postnatal whorls 4. Axial ribs sharply pointed at the shoulder producing a coronate appearance, extending only a short distance towards base on body whorl, 17–20 (22) on 1st whorl, decreasing to 10–14 on last whorl; on 1st whorl spiral striae on upper part and in the intervals between the ribs (if unworn extending across the ribs), on later whorls visible only on upper part (shoulder to suture). Columella with 6 pleats, the upper 3 obscure. Outer lip in adult thickened and ascending towards shoulder of previous whorl. A well-marked columella callus. 83 × 39 mm., others 74 × 36, 78 × 42 mm.

Operculum?

Salmon coloured, with white spiral bands, 7 between shoulder and base on body whorl, crossed by darker lines, two of the broader intervening salmon bands with brighter salmon or orange-brown patches, sometimes somewhat irregular; a dark spot on front of each tubercle; columella and interior of outer lip pinkish, callus white.

Radula with *c.* 53 rows (Cooke).

Off Durban, 40 fathoms (Smith). Natal coast, from fish stomachs. (S. Afr. Mus.). Not taken by the *Pieter Faure.*

Remarks. Smith gave the distinctive differences between this species and *festiva*, size being one of them; but he omitted the sizes of the respective protoconchs. Comparisons as regards size are risky. Smith did not give the size of *festiva*, but said *ponsonbyi* was the smaller species. His specimen with thickened outer lip, therefore presumably mature, was 57 mm. long (there is an exactly similar sized one in S. Afr. Mus., also with thickened lip); but this is greatly exceeded by several specimens in S. Afr. Mus., viz. (with thickened lip and more or less developed callus) 54 (2 specimens), 57, 59, 60, 64, 65 (2 specimens), 74, 78 and 83 mm.

There is a tendency in some specimens for the tubercles to become obsolete on the later part of last whorl; in one specimen the tubercles cease abruptly (only 9 instead of 11 or 12), and the profile of this part of the whorl is evenly curved with scarcely any shoulder.

The dimensions of the 3 largest specimens show that there are plump and slender individuals.

Has been taken only from fish stomachs.

Voluta queketti Smith

Fig. 5

1901. Smith. loc. cit., p. 234, text-fig.
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 226.
1922. Cooke. loc. cit., pp. 7, 10, fig. 6 (radula).

Spire pointed, aperture $1\frac{1}{2}$–$1\frac{3}{4}$ times spire. Protoconch $2\frac{1}{2}$ whorls, diam. 1·75–2 mm. Postnatal whorls 5. Axial ribs 19–21 on 1st whorl, decreasing to 11–14 on last whorl, extending from suture to suture and $\frac{2}{3}$ towards base on body whorl, sharp, especially in juvenile, at top forming projecting points (especially sharp in juvenile), subcoronate and concealing the sunken suture, but rounded off on the last whorl leaving the suture exposed; numerous close-set spiral striae over whole whorl, becoming more widely separated on base, especially well marked at the tops of the ribs in juvenile. Columella pleats 6 (or 7), the upper one or two feeble, in the largest specimen 6 distinct pleats. Outer lip in largest specimen somewhat exsert, sharp edged. 51 × 22 mm.

Operculum narrow-oval, 11 × 4·25 mm. in aperture 30 mm. of 51 mm. shell, nucleus a little distance from apex and nearer the outer than the inner margin.

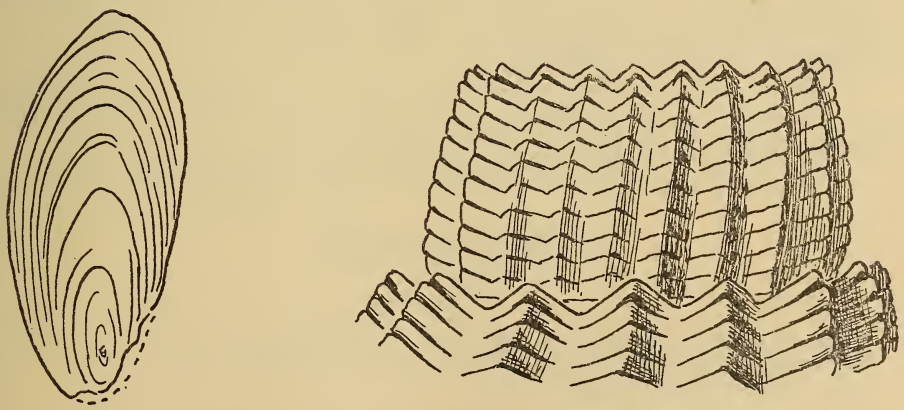


Fig. 5.
Voluta queketti Smith. Operculum of 51 mm. shell. Second and upper part of 3rd whorl of 16 mm. juvenile.

Pale yellowish flesh-tint (Smith) with bright red blotches on upper ends of ribs, an irregular interrupted red band above middle of body whorl and some spots on lower part. Smith's description applies to the present specimens. The largest one, taken alive, has the internal margin of outer lip pinkish, columella white; operculum horn colour.

Radula with *c.* 41 rows (Cooke).

Off Durban, 40 fathoms (Smith); off Cape Natal (Durban), 27 [*sic* = 55] fathoms; off O'Neil Peak (Zululand), 90 fathoms; off Umhloti River (Natal), 27 [*sic* = 54] fathoms (Sowerby).

Off Umhloti River (Natal), 40 fathoms, one living; off Cape Natal, 54–55 fathoms, 7 dead (one 36 mm. long, 4 juv. and 4 broken); off O'Neil Peak, 55 fathoms, one dead (34 mm. long) and one broken (S. Afr. Mus. P.F. coll.).

Remarks. Plump and slender forms occur: 37 × 17 (Smith's type), 36 × 19 and 34 × 15 mm. (S. Afr. Mus.). S. Afr. Mus. has juveniles 14 mm. (protoconch incomplete) to 20 mm. long.

Smith had one specimen; Sowerby returned 7 P.F. specimens, now in S. Afr. Mus., but apparently retained the O'Neil Peak specimen from 90 fathoms (unless the depth is wrongly recorded, as in his other two records). No record is available of how many specimens were sent to Sowerby by Dr. Gilchrist. Probably it is correct to say that less than a dozen complete specimens are known (unless some have since been obtained by private collectors).

Tomlin and Shackleford, to whom two juveniles were submitted some years ago, remarked on their 'extreme likeness to some of the forms from the Barton Beds and the Paris basin'; in fact they doubted whether the shells were really South African!

Smith stated that the Mauritian *delessertiana* has at least 15 columella pleats, but, as in the case of *ponsonbyi*, made the risky statement that *queketti* was a smaller species, and again without giving the dimensions of the protoconchs. The largest known specimen is 14 mm. longer than the type, and may be more comparable with *delessertiana* in size.

The 51 mm. specimen fortunately retains the operculum, showing that this species is correctly assigned to the subgenus *Lyria*. When the animal was removed is not known.

Named after Mr. Quekett, then curator of the Durban Museum.

Voluta bullata Swainson

Fig. 6

1829. Swainson. *Zool. Illustr.*, ser. 2, vol. i, pl. 15 (Voluta, pl. 1.).
1859. Chenu. *Man. Conchyl.*, i, fig. 956.
1901. Smith. loc. cit., p. 234.

Spire low, blunt; aperture 4 times spire (profile from suture to apex; 5–6 times if true vertical height measured), occasionally $4\frac{1}{2}$ or even 5 times. Protoconch 1 ($1\frac{1}{2}$) whorls, diam. 4 mm. Postnatal whorls 3 ($3\frac{1}{2}$); smooth, without

ribs, shoulder, or spiral striae, except some spiral grooves on lower half of body whorl. Columella pleats 2, with an obscure third one above; a narrow parietal callus in the posterior angle of the aperture. 62 × 30 mm.

Operculum and radula unknown.

Pale brown with darker speckling and irregular marks which form three faint spiral bands, towards the outer lip spiral lines in pairs or threes: juveniles (16 mm.) with dark spiral line dotted with white. The 1st whorl has a 'necklace' of alternating brown and white spots at the suture. Callus dark chestnut-brown.

Port Elizabeth (Sowerby); Algoa Bay (Reeve); Port Alfred (Bartsch, Turton).

FIG. 6.

Voluta bullata Swainson. Slightly oblique apical views of protoconch of 16 mm. shell (*left*) and 29 mm. shell (*right*).

Port Elizabeth and Algoa Bay, St. Francis Bay (= Jeffreys Bay), Still Bay; all dead and more or less worn (S. Afr. Mus.).

Not taken by the *Valdivia* or the *Pieter Faure*. No record of a living specimen, though dead shells are fairly common.

Remarks. The smallest specimen in S. Afr. Mus. is 16 mm. long. Measurements of other (selected) specimens are: 55 × 27, 56 × 29, 57 × 25, 60 × 29, 62 × 29, 62 × 30.

The colour of the parietal callus seems to fade more rapidly than the external markings of the shell, although not so exposed to abrasion.

Type in the British Museum.

Subgen. *Afrivoluta* Tomlin

1947. Tomlin. *J. Conch.*, xxii, p. 244.

Four strong columella pleats. Operculum and animal unknown.*

Proposed by Tomlin as a genus, but here treated as subgenus.

* In an American dealer's catalogue (1957) this species was illustrated, and a specimen 'Taken alive and perfect' was offered for sale. Presumably the animal was extracted and thrown away.

Voluta (*Afrivoluta*) *pringlei* Tomlin

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 199, pl. 34 (22), fig. 18 (*Voluta* sp.).
1947. Tomlin. loc. cit., p. 245, text-fig.

Spire low, blunt; aperture $3\frac{1}{2}$ (juv.) to nearly 3 (adult) times spire. Protoconch 2 whorls, diam. 7·5–8 mm. Postnatal whorls 3; smooth, with fine lines of growth, very fine spiral striae in the type, but none visible in the S. Afr. Mus. adult or juveniles. A flat sutural band of callus adnate to the previous whorl, with irregular upper margin, on body whorl expanding into the large oval or subcircular parietal callus (*c.* 30 mm. diam.) extending from upper suture on body whorl to below the posterior end of aperture; this callus is the easiest means of distinguishing the start of the 1st postnatal whorl from the protoconch. Columella pleats 4, very prominent; columella projecting slightly below base of aperture. Outer lip in adult slightly exsert, and reflexed in lower half $4\frac{1}{4} \times 1\frac{1}{2}$ in. (*c.* 110 × 40 mm.) (Tomlin); $4\frac{3}{4} \times 1\frac{7}{10}$ in. (120 × 45 mm. (S. Afr. Mus.); juveniles 34–35 × 15–16 mm. (S. Afr. Mus.).

Chestnut-brown with 2 broad bands of pale reddish brown on body whorl, sutural edging white, columella pleats red, interior rusty reddish-brown, callus reddish (Tomlin). The S. Afr. Mus. adult is similar, but the general colour, including columellar pleats and aperture is orange-salmon, the bands faintly whitish, callus white.

35° 11′ S. 23° 2′ E., 500 metres (Thiele); SE. of Cape Recife, 120 fathoms, and off Jeffreys Bay (St. Francis Bay), west of Cape Recife (Tomlin).

Off Glendower Beacon (Port Alfred area), 100 fathoms; 34° 27′ S. 25° 42′ E., 250 fathoms; and off Cape St. Francis, 75 fathoms; one juvenile from each station (S. Afr. Mus. P.F. coll.).

The *Valdivia* locality is farther west on the Agulhas Bank than the other localities. The single broken specimen came up in the same haul with a living *Neptuneopsis gilchristi*; it measured 62 × 24 mm., but owing to its fragmentary condition Thiele refrained from naming it.

The *Pieter Faure* obtained only the three juveniles recorded above.

Remarks. As Tomlin said this is the most noteworthy South African shell discovered since the Cape Government trawler *Pieter Faure* obtained *Neptuneopsis gilchristi* in 1897; but he forgot *Pleurotomaria africana* which was discovered by the Fisheries Survey vessel *Africana* in 1931 but not described and named until 1948.

Gen. Volutocorbis Dall

1890. Dall. *Trans. Wagner Free Inst.*, iii, p. 74 (type † *limopsis* Conrad).
1929. Thiele. *Handbuch Syst. Weicht.*, i, p. 344 (s.s. type *abyssicola*).

Operculum absent. Columella with pleats. Radula with tricuspid central tooth, and a transversely oblong, unicuspid lateral tooth.

Remarks. See Sowerby (loc. cit. *infra*). Dall included fossil and Recent species, but Thiele restricted the genus to contain two Recent species only. Allied to the fossil *Volutilithes* Swainson 1840 (type † *spinosa* Lam.).

Volutocorbis abyssicola (Ad. & Rve.)

Figs. 7(*a*), 9(*a*)

1848. Adams & Reeve. *Zool. Samarang. Moll.*, p. 25, pl. 7, fig. 6, juv. (*Voluta a.*).
1886. Watson. *Rep. Challenger*, xv, p. 258, pl. 15, fig. 1, adult (*Voluta a.*).
1889. Studer. *Forschungsreise Gazelle*, iii, pp. 52, 55.
1900. Woodward. *Proc. Mal. Soc.*, iv, p. 121, pl. 10, figs. 4–8, 10, 12 (anatomy).
1901. Smith. loc. cit., p. 235 (*Volutilithes a.*).
1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 97, pl. 2, fig. 6 (radula) (anatomy) (*Volutilithes a.*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 31 (*Ternivoluta a.*).
1903. Thiele. ibid., p. 170; pl. 9 (4), fig. 65 (radula).
1922. Cooke. loc. cit., p. 7 (radula).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 200.

Numerous fine axial ribs and spiral lirae forming a cancellate sculpture, with sharp points at the intersections, the first spiral lira with its points forming a narrow shoulder but not concealing the suture; intervals between 1st and 2nd lirae (sometimes between 2nd and 3rd) greater than intervals between the following lirae, forming a shallow groove a little distance below the suture; axial ribs 18–21 on 1st whorl, increasing to 60 or 70 (80 in largest specimen) on body whorl. Aperture $2\frac{4}{5}$ (juv. 14 mm.) decreasing to $2\frac{1}{3}$ or 2 times spire. Protoconch 2 ($2\frac{1}{2}$) whorls, diam. 2 mm. Postnatal whorls 5. Columella pleats 1 in protoconch, 2 in 1st whorl, increasing to 10–12 in adult, but very variable in adults, some pleats being smaller intermediaries between pairs of larger pleats, being as Thiele stated (1925, p. 200) the spiral lirae of the previous whorl overlaid by callus; he regards only the 4 lowermost as true columella

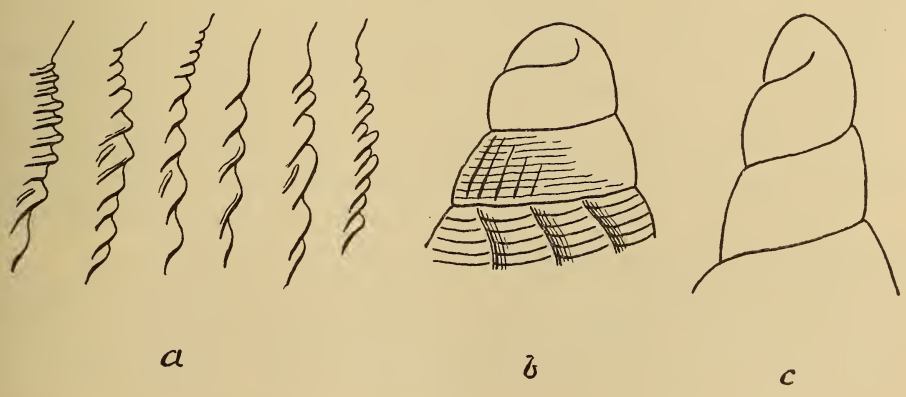


Fig. 7.

(*a*) *Volutocorbis abyssicola* (Ad. & Rve.) variation in columella pleats in adults. (*b*) *Fusivoluta pyrrhostoma* (Watson) protoconch of typical form. (*c*) worn protoconch of forma *major*.

pleats. From the columella a thin parietal glaze extends over base, not concealing the underlying sculpture, its edge adnate to the shell but sometimes with a very slight free edge at the end of the rostrum. Outer lip in adult slightly exsert, margin denticulate, internally plicate. $3\frac{4}{5} \times 1\frac{1}{2}$ in. (96 × 38 mm.) (Watson). A specimen in S. Afr. Mus. has same width and was probably of equal length (protoconch and end of canal broken). 97 × 40 mm. (in a private collection).

Smallest specimen in S. Afr. Mus. 11·5 × 6 mm., protoconch plus 2 whorls. Smallest specimens with denticulate outer lip, presumably mature, 45 × 23 and 46 × 21 mm.

Pale horny or biscuit-coloured, glossy when fresh; some half-grown specimens show 4–5 faint bands of slightly darker spots; interior of aperture faintly pinkish or orange. As preserved, animal dark; in life it might possibly be mauve or purplish (cf. *lutosa*, *infra*).

Radula with 100–105 rows; the oblique hind margins of the lateral teeth are sometimes slightly crenulate.

Off Cape of Good Hope (Adams & Reeve, Watson); 34° 6′ S. 18° 6′ E., 117 fathoms (Studer); 34° 43′ S. 18° 30′ E., 125 fathoms (Sowerby); 33° 41′ S. 18° 0′ E., 178 metres; 35° 16′ S. 22° 26′ E., 155 metres; and 34° 33′ S. 18° 21′ E., 318 metres (von Martens).

30° 2′ S. 15° 2′ E., 199 fathoms (s.s. *Africana*, per U.C.T.).

Numerous stations along the south-western slope of the continental shelf off Cape Point and the west coast of the Cape Peninsula, 85–230 fathoms, live and dead specimens; also dead shells from the Agulhas Bank and its southern margin (*vide infra*) (S. Afr. Mus. P.F. coll.).

Remarks. Plump and slender individuals occur: e.g. 70 × 33 and 68 × 28 mm. The protoconch is almost always more or less corroded.

Typically the axial ribs and spiral lirae are approximately equally strong. But there is a tendency for the spiral lirae to become weaker or even obsolete, thus producing a ribbed instead of a cancellate sculpture. This is well shown in a series of 11 specimens (24–38 mm. long) containing both cancellate and ribbed examples from Brown's Bank, approx. 36½° S. 21° E., 100–200 fathoms. The first row of prickles near the suture, and the 2nd row are distinct (and sometimes the 3rd), but across the middle of the whorl they disappear, leaving the axial ribs smooth; the spiral lirae reappear towards the base (P.F. coll.).

Three ribbed examples, 27–36 mm. long., were also taken off Cape Seal, 80 fathoms, and off Cape St. Blaize, 85–90 fathoms (P.F. coll.).

Two dead examples (one of them given to Tomlin) from 34° 34′ S. 18° 32′ E., 100 fathoms, 60 × 29 mm.: sharp cancellate sculpture but spiral lirae on body whorl tending to greater prominence than the axial ribs: protoconch narrower than in typical examples, diam. 1·5 mm. (slightly corroded); columella pleats 2 with one intermediary and 3 above very feeble; parietal glaze adnate to shell without free edge; outer lip broken away. In some respects approaching *lutosa* (P.F. coll.).

Four living and 2 dead examples, 31 × 16 to 35 × 17 mm. long, from off South Head, Saldanha Bay, 190 fathoms: protoconch diam. 2 mm.; axial ribs predominating, sculpture in the youngest sharp, in the others more or less corroded; columella pleats 2 plus 4 small (in the youngest), 1 plus 6 or 7, the latter decreasing in size posteriorly (2 specimens), 2 plus 1 intermediary and 3 small above (2 specimens); parietal glaze with free edge except in the youngest; outer lip except in the youngest thickened by close aggregation of growth-lines externally, internally feebly denticulate and plicate in one specimen, with obscure traces of denticles in two others. Radula as in *abyssicola* (P.F. coll.).

In having a free edge to the parietal glaze these specimens also approach *lutosa*.

One living and one dead from off Duminy Point, 87 fathoms (slightly farther north than South Head), 45 × 22 (living), 50 × 24 mm. (dead): apex 'acute', protoconch narrow, diam. 1·5 mm.; cancellate sculpture sharp on upper whorls, somewhat corroded on body whorl; columella pleats 3, upper one small, plus 2 obscure (smaller specimen), 2 plus 1 intermediary and 1 above obscure (larger specimen); parietal glaze with free edge; outer lip broken. Radula as in *abyssicola* (P.F. coll.).

These shells appear to be referable to *lutosa*.

var. *lutosa* Koch

1948. Koch. *J. Conch.*, xxiii, p. 5, pl. 2.

Similar to *abyssicola*. Koch said 'apex acute', but the acuteness appears due to corrosion; sculpturing not so sharp, which is also due to corrosion, young specimens being like *abyssicola*; columella pleats 3–5, the upper 2–3 being feeble; in larger examples the parietal glaze thicker, nearly concealing the sculpture on body wall, because the animal deposits the glaze over the layer of clay covering the shell, consequently when the shell is cleaned the edge of the glaze is free not adnate. 80 × 35 mm. (Koch).

Cream (when not corroded), interior of aperture pale orange-brown, animal mauve (Koch).

Off Port Nolloth and Orange River mouth, 40–60 fathoms (Koch).* 32° 9′ S. 18° 6′ E., 59 fathoms (s.s. *Africana*, per U.C.T.). Frequently encased in stiff red-brown or umber-brown clay.

Remarks. The P.F. examples described above as variants of typical *abyssicola* impair the validity of this form as a full species. I regard it, at most, as a variety. The two forms seem to overlap in the vicinity of Saldanha Bay, and the slight differences appear to be due to habitat.

I have seen 15 *Africana* examples (AFR. 718 B.) from 26 to 75 mm. long.

* In the same American dealer's catalogue mentioned in the footnote, p. 23, a 'Paratype' was offered for sale.

Volutocorbis gilchristi (Sow.)

1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 99, pl. 2, fig. 5.

Spire high, aperture $1\frac{3}{4}$ times spire. Protoconch diam. 1·5 mm. (broken). Postnatal whorls 4; axial ribs *c.* 22 on 1st whorl, *c.* 24 on body whorl (Sowerby: 16, ? typ. err. for 26); spiral lirae obscure on 1st–3rd whorls, but distinct on body whorl, especially towards base; top of whorl projecting above the sunken suture as a crenulate or denticulate ridge, somewhat corroded and not so noticeable on upper whorls; 2nd spiral lira separated from ridge farther than the following lirae one from another. Columella pleats 6, decreasing in size posteriorly. Outer lip reflexed, thickened, several closely aggregated growth-lines forming a stout varix externally, internally obscurely denticulate. Parietal glaze slight, adnate to shell. 30 × 15 mm. (Sowerby); 28 × 13 mm. (cotype, S. Afr. Mus.).

White with pale cream glassy periostracum.

Off Cape Natal (Durban), 200 fathoms (Sowerby).

Same locality, 185–200 fathoms (S. Afr. Mus. P.F. coll.).

Type ? in coll. Sowerby (? Brit. Mus.); cotype in S. Afr. Mus.

Remarks. Distinguished by the deeply sunken suture. Von Martens when describing (1903) *epigona* from East Africa did not mention *gilchristi*; and Thiele in his Handbuch (1929, p. 345) seems to recognize *abyssicola* and *epigona* as the only two species in the genus.

V. epigona (1903. *D. Tiefsee Exp.*, vii, p. 106, text-fig.) is slightly larger than *gilchristi* (text said 30 mm., but the line alongside the enlarged figure measures 33 mm.). It differs in having 8 columella pleats, the upper ones much more strongly developed than in *gilchristi*; and strong plicae within the outer lip which is not thickened. The suture is not mentioned, but judging by the figure, is not so deeply sunken.

Gen. Fulgoraria Schumacher

Columella with 6–8 pleats.

Saotomea Habe 1943 was described as a section or subgenus with one columella pleat and a lozenge-shaped operculum.

Fulgoraria blaizei n. sp.

Fig. 8(*b*)

Aperture subequal to spire. Protoconch mammiliform, 2 ($2\frac{1}{2}$) whorls, diam. 2·8–3·5 mm., smooth, junction with 1st postnatal whorl indistinct in three specimens but abrupt in the 24 mm. specimen. Postnatal whorls 4, profile evenly curved, without shoulder; slightly arcuate low axial ribs 16–18 on 1st whorl, 18–20 on 2nd, ill-defined and petering out on 3rd whorl; fine spiral lirae traceable only on 1st and 2nd whorls. Growth-lines fine, arcuate.

About 20 spiral lirae on base. Aperture narrow ovate, canal rather short. Columella with one pleat, best seen on the 39 mm. specimen (taken alive), very indistinct on the dead ones. 42 × 15 mm., 39 × 11·5 mm., 24 × 9·5 mm., 18 × 6·5 mm.

Operculum obovate, nucleus apical (but apex broken), 8·5 × 3·5 mm. in 39 mm. shell with aperture 17 mm.

Uniform salmon-buff, protoconch white, operculum pale amber; the two dead specimens pale buff.

Off Cape St. Blaize, 73 miles, 125 fathoms, one 42 mm., one 24 mm., and one 18 mm., dead; same locality, 105 fathoms, one living 39 mm. (S. Afr. Mus. A3433 type (live), A3430 cotypes. P.F. coll.).

Remarks. Provisionally placed in the genus *Fulgoraria.*

There is no record whether these specimens were submitted to Sowerby; probably not. Nor is it known when the animal was removed from the only specimen taken alive.

The spiral lirae are finer and closer together in the 42 mm. and 24 mm. specimens, than in the type and the smallest specimen.

Gen. Fusivoluta von Martens

1902. Von Martens. *SB. Ges. naturf. Fr. Berlin*, p. 237.

Operculum oval, nucleus apical, curved to left. Columella without pleats. Radula with tricuspid central tooth, no lateral.

Fusivoluta pyrrhostoma (Watson)

Figs. 7(*b*), 9(*b*)

1882. Watson. *J. Linn. Soc. Lond.*, xvi, p. 374 (*Fusus* (*Sipho*) *p.*).
1886. id. *Challenger Rep.*, xv, p. 208, pl. 12, fig. 2 (*Fusus* (*Sipho*) *p.*).
? 1889. Studer. *Forschungsreise Gazelle*, iii, pp. 52, 54 (*Fusus mandarinus*, non Duclos).
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 226, pl. 3, fig. 1 (shell, operculum, radula, anatomy).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 32, pl. 3, fig. 15.
? 1903. id. ibid., p. 33 (*Fusus mandarinus*, non Duclos).
1903. Thiele. ibid., p. 171, pl. 9 (4), fig. 67 (radula).

Aperture subequal to spire. Protoconch 2½ whorls, diam. 2·5 mm. Postnatal whorls 5; axial ribs on 1st whorl 13–14, on body whorl 15–20, but gradually becoming obsolete, arcuate, beginning at suture and sometimes forming a very slight shoulder, obsolete on base, sharp (when not worn), narrower than intervals; crossed by *c.* 15–18 or 20 spiral lirae. Columella slightly curved, parietal glaze concealing sculpture, adnate to shell without free edge. 42 × 17 mm. (*Challenger*: 38 mm.).

Operculum 12 × 5 mm. in 42 mm. shell.

Dull white, fresh specimens with very thin pale fawn periostracum, aperture internally pale orange-salmon.

Radula 1·5 mm. long, with *c.* 45 rows. Thiele's specimen was also 1·5 mm. long.

34° 41′ S. 18° 36′ E., 98 fathoms (Watson); 33° 59′ S. 17° 52′ E., 50 fathoms (Studer); 34° 20′ S. 18° 36′ E., 70 metres, and 34° 33′ S. 18° 21′ E., 318 metres (von Martens). Sowerby gave no locality.

Mouth of False Bay and off Cape Point and the west coast of the Cape Peninsula, 45–200 fathoms; Brown's Bank (approx. 36½° S. 21° E.), 80–100 fathoms; Cape St. Blaize, distant 73 miles, 125 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. It is most unlikely that the New Zealand *Fusus mandarinus* occurs off Cape Point. Moreover von Martens's characterization of the two dead *Gazelle* shells might well apply to some of the present examples: superficially ('aüsserlich') similar [to *pyrrhostoma*] with narrower ('feinere') apex unlike that of a *Voluta*, ribs disappearing on 6th [i.e. penultimate or 4th postnatal whorl] and relatively greater length of the visible portion of the whorls; 31 mm. long. Except for the last, rather vague, character there are similar *worn* shells in the P.F. series with narrow pointed protoconch.*

The columella is usually more curved than in Watson's figure.

forma *major* n.

Figs. 7(*c*), 9(*c*)

Two specimens considered by E. A. Smith and L. J. Shackleford to be extra large specimens of *pyrrhostoma*.

Off South Head (Saldanha Bay), 190 fathoms. 60 × 24 mm., smaller specimen 55 × 22 mm. with protoconch and operculum, taken alive but animal not preserved (A3429).

Both specimens much corroded, even the live one. Traces of axial ribs remain on the 3rd and 4th whorls, but apparently they were not developed on the body whorl, thus resembling the typical form (S. Afr. Mus. P.F. coll.).

A live specimen, 74 × 25 mm., was taken by the s.s. *Africana* (AFR. 738 D., submitted per U.C.T.) at 30° 21′ S. 16° 50′ E., 185 metres. Protoconch and upper whorls corroded. Postnatal whorls 6; axial ribs well marked but feeble and irregular on back of last whorl and outer lip; spiral lirae obsolete. Radula 5 mm. long, with 58 teeth.

Fusivoluta capensis (Thiele)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 179, pl. 31 (19), fig. 27 (*Glypeuthria* ? *c.*).
1931. Tomlin. *Ann. S. Afr. Mus.*, xxx, p. 165, fig. 6 (*Glypeuthria capensis*, non Thiele).
1945. id. *J. Conch.*, xxii, p. 135 (*Glypeuthria sculpturata* nom. nov. for *capensis* Tomlin preocc.).
1957. Barnard. ibid., xxiv, p. 210 (radula, generic position).

* Krauss (1848, p. 110) mentions the similarity of his *Fasciolaria badia* (= *lugubris* Rve.) to *Fusus mandarinus*; the *Gazelle* shells may be this species, but I think they are far more likely to be *pyrrhostoma*.

Aperture slightly shorter than spire (by about the length of the protoconch). Protoconch 2 whorls, diam. 2 mm. (but corroded). Postnatal whorls 6. Axial ribs 12–14 on 1st whorl (but this whorl usually corroded), 18 on body whorl, slightly arcuate, beginning at suture, extending across base; crossed by 18–20 strong spiral lirae which are finer in the upper part of the whorl near suture. Columella curved, canal short; parietal glaze concealing sculpture, adnate, without (sometimes very slight) free edge. 38 × 15 mm.

Operculum oval, nucleus apical (but usually broken), curved to left, 7 × 4 mm. in 29 mm. shell.

Greyish white, operculum amber coloured.

Radula 2·75 mm. long, with 45–50 teeth, indistinguishable from that of *pyrrhostoma*.

35° 9′ S. 18° 33′ E., 564 metres (Thiele); off Cape Point, 318–400 fathoms (Tomlin).

In addition to those sent to Tomlin, there are specimens from between 250 and 560 fathoms off Cape Point (S. Afr. Mus. P.F. coll.).

Remarks. Comparison of the smallest P.F. specimen, although twice as large as Thiele's *Valdivia* specimen, with his figure leaves no doubt as to the identity. Tomlin did not see this specimen. Nor was any animal sent to Tomlin.

This species appears to live in deeper water than *pyrrhostoma*.

Though the two species have a slightly different appearance—*capensis* is less fusiform and more distinctly spirally lirate—the descriptions read very much alike as regards details. Possibly intergrading forms will be found.

Fusivoluta decussata n. sp.

Fig. 8(*c*)

Aperture (as preserved) subequal to spire without protoconch. Protoconch mammiliform, 2 (2½) whorls, diam. 3·5 mm., smooth but with a few axial pliculae towards the junction with 1st postnatal whorl where the spiral lirae start. Postnatal whorls (as preserved) 4, profile evenly convex; with slightly arcuate axial ribs and spiral lirae producing a cancellate sculpture, the ribs a little more prominent than the lirae, intersections slightly nodulose; *c.* 30 ribs on 1st whorl, *c.* 45 on 2nd, 55 on last whorl (but some feebler and closer together than others making an exact count difficult); 7 lirae on 1st whorl, 8 on 2nd, 9 on 3rd, and 10 on last whorl, about 6 additional on base. Columella slightly curved, without pleat. Aperture oval, canal narrow (but lip broken). 35 × 12 mm.

Buffalo River (East London), 15 miles, 310 fathoms, one dead specimen and one fragment of a juv. (S. Afr. Mus. A3432. P.F. coll.).

Remarks. This distinctive shell is placed provisionally in *Fusivoluta*, although the animal is unknown. The protoconch is larger than in *pyrrhostoma*, and relatively larger than in *anomala* von Martens.

Fusivoluta elegans n. sp.

Fig 8(*a*)

Aperture a little longer than spire (11 : 8 mm.). Protoconch 1½–2 whorls, alt. 1 mm., diam. 1·2 mm., smooth, with a few axial pliculae towards junction with 1st postnatal whorl. Postnatal whorls 4½–5, profile convex, on the lower whorls the upper part flat but without definite shoulder. Axial ribs 13 or 14 on 1st whorl, 15 on 2nd, 16 on 3rd, 17 on 4th, and 19 on last whorl; on penultimate and last whorl the growth-lines become prominent and form intermediary riblets, usually 2 (3) between each pair of main ribs; ribs obsolete on base; crossed by spiral lirae 5 on 1st whorl, 7 on 2nd, 9 on 3rd, 12 on 4th and 13–14 on last whorl; on 3rd–5th whorls lirae slightly stronger on the lower convex part than on the upper flat part of whorl, intersections with main ribs slightly nodulose, those with the intermediaries a little more conspicuous, *c.* 20 additional lirae on base. Columella almost straight, without any indication of a pleat. Canal rather long. 19 × 6·5 mm.

Off East London, 400 fathoms, one dead (S. Afr. Mus. A8803. P.F. coll.).

Remarks. Placed in *Fusivoluta* because the sculpturing is essentially similar to that of *pyrrhostoma*, *anomala* and *capensis*. The size of the protoconch (unworn), however, indicates a smaller species.

Somewhat resembling in shape *hilgendorfi* von Martens (1897) placed in the genus *Benthovoluta* Kuroda & Habe (1950. *Illustr. Cat. Jap. Sh.*, no. 5).

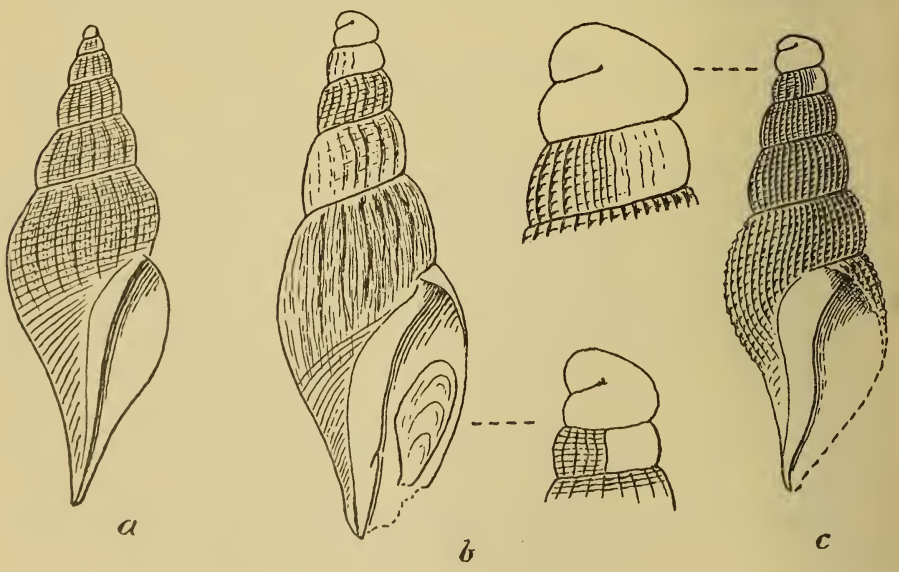


Fig. 8.

(*a*) *Fusivoluta elegans* n. sp. (*b*) *Fulgoraria blaizei* n. sp., with protoconch further enlarged. (*c*) *Fusivoluta decussata* n. sp., with protoconch further enlarged.

Gen. Neptuneopsis Sow.

1898. Sowerby. *Mar. Invest. S. Afr.*, i, p. 5 (exact date ? printer's order number on cover of reprints gives . . . 3, 1898, which presumably means March).
1900. Woodward. *Proc. Mal. Soc.*, iv, p. 120 (anatomy).
1902. Pace. ibid., v, p. 25 (anatomy).

Columella without pleats. Operculum ovoid, nucleus apical. Radula with tricuspid central tooth and degenerate lateral.

The genus is monotypic.

Neptuneopsis gilchristi Sow.

Fig. 9(*d*)

1898. Sowerby. loc. cit., p. 6, pl. 1 (shell, operculum, radula).
1900. Woodward. loc. cit., p. 120, pl. 10, figs. 2, 3, 11, 13, 14.
1902. Pace. loc. cit., p. 25, pl. 2, figs. 5–8.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 33.
1903. Thiele. ibid., p. 171, pl. 9 (4), fig. 68 (radula).

Protoconch conical, apex pointed, usually slightly lop-sided, size variable: 9 × 6, 9 × 7, 10 × 6·5, 11 × 7, 11 × 8·5 mm. Postnatal whorls 6; finely striated axially and spirally, growth-lines coarser, surface dull. Aperture subequal to spire. Outer lip slightly reflexed. Up to 198 × 70 mm.

Shell pinky-white, periostracum amber-brown or greyish-brown, or slightly olivaceous, operculum chestnut-brown.

Radula: see p. 35.

Off 'Cape of Good Hope', 33 fathoms [34° 17′ S. 18° 35′ E., False Bay] living (Sowerby); 35° 10′ S. 23° 2′ E., 500 metres, living (von Martens).

Off west coast of Cape Peninsula, 160 fathoms, living (U.C.T. ex trawler).

Off west coast of Cape Peninsula, 60–91 fathoms, living (S. Afr. Mus. P.F. coll.).

Agulhas Bank: off Cape St. Blaize and Flesh Point, 33–105 fathoms, dead; off Nanquas Peak (eastern part of Algoa Bay), 49–59 fathoms, dead (S. Afr. Mus. P.F. coll.).

S. Afr. Mus. also has two specimens with opercula from the Ross-Frames collection, without record of how or where obtained, but probably purchased from trawlers.

Remarks. The most notable of the many novelties obtained by the *Pieter Faure*.

In the Report of the Government Biologist for 1897, p. 10, there is no mention of the capture of this large mollusc, nor in fact of any of the captures except fishes.

There was formerly (about 1917) in the Museum of the Zoology Department of the South African College (where Dr. Gilchrist was Professor of Zoology) a dry shell labelled 'Type'. This may possibly have been the Type,

but it appears to have been lost when the Zoology Department moved out to the new University buildings in the suburbs.

A specimen, shell and animal in alcohol in S. Afr. Mus., was taken on 8 September 1897 at Station IX in False Bay (34° 17′ S. 18° 35′ E.) in 33–40 fathoms, bottom fine white sand. The shell is 170 mm. in length; the operculum has not been removed from the animal, which has not been dissected. This specimen therefore cannot be the Type.

Only two other living specimens were taken, both off the west coast of the Cape Peninsula, one in March 1900, the other in August 1903 (both in S. Afr. Mus., from one of which I have removed the radula).*

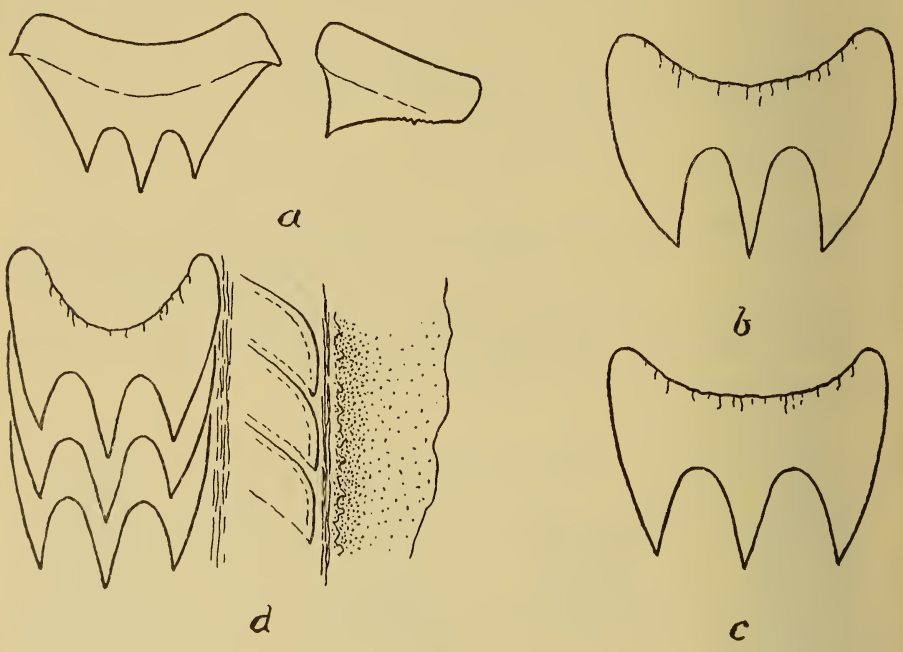


FIG. 9.

(*a*) *Volutocorbis abyssicola* (Ad. & Rve.), central and lateral plates of radula. (*b*) *Fusivoluta pyrrhostoma* (Watson), central plate of radula. (*c*) *F. pyrrhostoma* forma *major*, central plate of radula. (*d*) *Neptuneopsis gilchristi* Sow., three central plates with degenerate lateral plates from near front end of radula; the expansion of the basal membrane thins out laterally as indicated by the spacing of the dots.

It seems therefore that *two* living specimens were taken at Station IX in False Bay. One sent to Sowerby and described by him in 1898; he himself seems to have extracted the radula and passed the animal (thus mutilated) on

* Pace (loc. cit., p. 21 and p. 25 footnote 2) records that the British Museum secured a spirit specimen (reg. no. 1901: 10.29.10) in 1901, which he dissected. There seems to be no record in the *Pieter Faure* log-book of the capture of this specimen.

to Woodward for dissection (see Woodward 1900, and Pace 1902). The second specimen is that now in S. Afr. Mus.; it can be regarded as no more than a topotype.

The *Valdivia* obtained a living example at 500 metres on the southern slope of the Agulhas Bank, indicating that the habitat probably extends westwards along the slope of the continental shelf to Cape Point and along the western coast of the Cape Peninsula. The locality at the mouth of False Bay may be regarded as an outlier, or possibly an exceptional occurrence.

The *Pieter Faure*, whose primary object was the discovery of inshore commercial fishing grounds, scarcely touched the southern fringe of the Agulhas Bank; which probably explains why only dead shells were obtained, except on the three occasions mentioned.

These dead shells came from two areas: one south of Flesh Point and Cape St. Blaize, the other at the eastern end of Algoa Bay. These two 'pockets' seem to indicate bottom currents flowing inshore, either westwards or possibly as reverse compensatory currents eastwards. As yet it is impossible to say whether the shells from the Algoa Bay pocket indicate a habitat of the living mollusc farther east on the continental shelf towards East London.

Radula (fig. 9*d*). Pace (loc. cit., p. 27 footnote 1) said, 'Sowerby's figure shows such discrepancies from my preparation that I venture to question whether the radula of . . . e.g. *Cymbiola ancilla*, may not have been accidentally substituted . . .'. This statement is quite unjustified. Pace's own figure (pl. 2, fig. 8) is quite comparable with those of Sowerby and Thiele (except for the inclusion of the lateral teeth), but none of these three figures is comparable with Pace's figure of *C. ancilla* (pl. 2, fig. 9); in the former the notches between the cusps are U-shaped, in the latter V-shaped.

In the specimen examined by me the teeth are closer together than in Sowerby's and Thiele's figures, more as drawn by Pace.

Pace (p. 28) said the lateral teeth disintegrated so rapidly in KOH that he had no time to make a drawing. He is perfectly correct in recording their presence. They can, however, scarcely be called teeth as they have no free margins; they are in fact indicated only by oblique thickenings in the basal membrane. They correspond in number with the central teeth, and are undoubtedly degenerate lateral teeth. There are 70–75 rows.

Fam. *HARPIDAE*

1916. Melvill. *J. Conch.*, xv, pp. 25–40.
1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 271, fig. (radula).

The only specimen of this family obtained by the P.F. was a 45 mm. *H. conoidalis* Lam. (identified by Sowerby), from off Umvoti River (Natal), 27 fathoms.

Also obtained at Delagoa Bay (U.W.).

Fam. *VASIDAE*

Bartsch (1915, p. 42) records *Xancus globulus* Chemn. from 'Cape of Good Hope'. This is certainly not an indigenous South African species.

Vasum turbinellum (Linn.) is also doubtfully indigenous, though it occurs at Mozambique Island (U.W.).

Turton's 'Xancus sp.' (1932. p. 45, pl. 10, no. 333), 3·5 × 2 mm., appears to be a juvenile *Mitra*.

Vasum truncatum Sow.

Fig. 10

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 17, pl. 4, fig. 85 (adult, worn).
1902. Smith. *J. Conch.*, x, p. 249, pl. 4, fig. 6 (*triangularis*, juv.).
1903. id. *Proc. Mal. Soc.*, v, p. 370, pl. 15, fig. 3 (adult).

Shell thick in adult, conical, spire very low but in juvenile protoconch and first whorl (or first two whorls) forming a projecting papilla. Protoconch: *v. infra*. Postnatal whorls 6. Shoulder with *c.* 11 blunt knobs, whose inclusion in succeeding whorls produces an undulate suture. Base with 4 or 5 blunt spiral ridges, more or less interrupted and nodose. Columella with 4 pleats, more or less equally strong; rimate anteriorly at snout but umbilicus open. Periostracum thick, scabrous with close-set growth-lines.

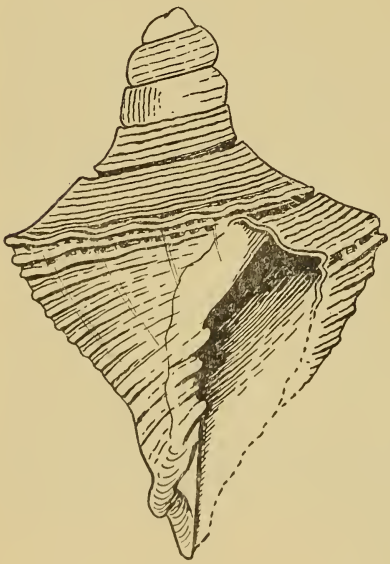


Fig. 10.
Vasum truncatum Sow., protoconch and first two postnatal whorls of juvenile 15 × 10 mm.

65 × 50 mm. (Sowerby); 48 × 35 mm. (Smith); 66 × 55 mm. (S. Afr. Mus. beach-worn, protoconch and first 3 or 4 whorls missing and end of canal worn); 41 (protoconch missing) × 32 mm., and 55 × 43 mm. (width across shoulder knobs) (S. Afr. Mus., the latter specimen retains most of the periostracum).

Port Elizabeth, Port Alfred (Sowerby, Bartsch, Turton); Port St. Johns (S. Afr. Mus.). In deep water off Durban and Port Shepstone (Smith); off Durban (S. Afr. Mus.).

A juvenile obtained by the P.F. off Umkomaas River (Natal), 40 fathoms, is worth a separate description and figure. 15 × 10 mm. Protoconch 2½–3 whorls, papilliform, gradually passing into first postnatal whorl without distinct junction; 1st whorl somewhat worn, 2nd with 5 or 6 very faint spiral carinulae, superseded at 2½ whorl by faint and

irregularly spaced axial pliculae, *c.* 16 in three-quarters of a whorl (may be either protoconch or 1st postnatal whorl). Postnatal whorls 2, the axial pliculae superseded by 6 spiral lirae, the lower 2 more prominent and forming a double peripheral keel. On 2nd whorl *c.* 8 lirae above the keel, below the keel *c.* 12 additional lirae with a weaker intermediary between each pair. Faint spaced growth-lines are traceable, but no axial ribs; the circumference, however, when seen from the apex is gently undulate, *c.* 11–12 lobes on 1st and 2nd whorls; these undulations are not prominent enough to cause nodulose projections on the base as they do in larger examples. Columella pleats 4, the 3rd thinner than the others (as is the case in two larger specimens 41 and 55 mm. in length). Snout slightly rimate.

Remarks. Type of *truncatum* in Bairstow collection (Oxford Mus.); of *triangularis* in British Museum.

Smith (1903) gave an emended description and recognized his *triangularis* as the not fully adult of *truncatum*; but he did not give the size of his Port Shepstone adult.

Fam. *MITRIDAE*

1919. Cooke. *Proc. Zool. Soc. Lond.*, p. 405 (classification according to radulae).
1922. Peile. *Proc. Malac. Soc.*, xv, p. 93 (radulae).
1936. id. ibid., xxii, p. 141 (radulae).
1937. id. ibid., xxii, p. 181 (radulae).

Cooke's paper on the radulae was based on the Gwatkin collection in the British Museum. Unfortunately, it seems that reliance cannot always be placed on the correct naming of the slides. Some errors have been detected (e.g. *Euthria queketti*). Suspicion also arises in one case in this family, namely '*circula* var.', under which Cooke (p. 415) said: 'There is evidently some confusion in the specimens forwarded [to Gwatkin] by Mr. Burnup. . . .' But this did not prevent the description of a new species *burnupiana*! (see pp. 48-49).

The results contained in Peile's papers, which were based on radulae extracted by himself from the respective shells, are far more acceptable.

Gen. Mitra Lam.

More or less fusiform. Central plate of radula more or less quadrate, with comparatively few (4–8) cusps, lateral plate broader, usually considerably broader than central, usually with numerous cusps, of which one or two may be enlarged. Ocasionally both central and lateral plates are unicuspid. The group containing *circula* has an arcuate central plate with numerous small cusps, the lateral also with numerous small cusps.

Mitra caffra (Linn.)

1758. Linne. *Syst. Nat.*, ed. 10, p. 732 (*Voluta c.*).
1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 208.
1935. Dautzenberg. *Mem. Mus. R. Hist. Nat. Belg.*, H.S. II, 17, p. 120 (*Turricula c.*) (references).

Aperture 1¼–1⅓ times the spire. Postnatal whorls 8 (S. Afr. Mus. specimen). Axial ribs 16–18 on early whorls, decreasing to 14–16, and becoming obsolete on 7th whorl; crossed by 3–4 spiral striae, 5 on body whorl, about 15 additional striae on base becoming stronger anteriorly. Columella pleats 4; outer lip plicate within. 40 × 15 mm. (S. Afr. Mus. specimen).

Chestnut-brown, with pale yellow or white peripheral band, and a second band in middle of base and outer lip, base below this band somewhat yellowish. Delagoa Bay (U.W.); Inhambane (U.C.T.); Mozambique (S. Afr. Mus.).

Distribution. Dar-es-Salaam (S. Afr. Mus.), East Indies, Philippine Islands, China.

Remarks. Two very worn specimens in the Ross-Frames collection labelled as from Mozambique.

As '*Mitra* sp.' Turton (1932. *Mar. Sh. Port. Alfred*, p. 46, pl. 10, no. 343) mentions 3 specimens, 26 mm. long, light brown with a darker band at the sutures. The photograph shows a dark shell with a light band above the suture and apparently on the upper part of the outer lip. The summit is very rounded, and the shell is obviously in an advanced stage of 'beach-wear'.

The resemblance of the photo to *caffra* is noticeable, and by grinding down one of the above-mentioned Mozambique specimens a very fair imitation of Turton's shell was obtained. There is, however, one difficulty in the way of this explanation: presumably the summit of Turton's specimen is solid shell (the photo is not at all clear), whereas in the artificially produced imitation the hollow interior of the whorl is exposed.

Turton's specimens (in spite of their condition!) should be re-examined.

Mitra euzonata Sow.

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 4, pl. 1, fig. 11.

Axial ribs 11 on 1st whorl, 15–16 on last whorl; spirally punctate-striate (Sowerby). 10 × 4·5 mm.

White with an orange-brown peripheral band.

Remarks. Very likely merely a colour variety of *Vexillum capense*. The suture is no deeper than in the latter.

Mitra kowieensis Sow.

1901. Sowerby. *Proc. Mal. Soc.*, iv, p. 213, pl. 22, fig. 17.
1932. Turton. *Mar. Sh. Port Alfred*, p. 47, pl. 10, no. 352 (*helena*, non Bartsch.).
1932. id. ibid., p. 47, pl. 10, no. 353 (*eucosmia*).
1933. id. *J. Conch.*, xix, p. 370 (*becki* nom. nov. pro *helena* preocc.).

Aperture subequal to spire. Protoconch 1½ whorls. Postnatal whorls 4 (Sowerby: 6, i.e. incl. protoconch), profile slightly shouldered. Axial ribs 11 on 1st whorl, 13–14 on last whorl, slightly narrower than intervals, extending across base; spiral striae 4 on 1st and 2nd whorls, 5–6 on later whorls, crossing

the ribs, on base 4 additional striae (i.e. 5 lirae) followed by 4–5 stronger lirae, intersections with ribs nodulose. Columella pleats 4. 6 × 2·5 mm.

White; Turton says fresh specimens are slightly pink.

Kowie (Port Alfred).

Remarks. Turton said there were broad and narrow individuals, but in spite of this he created a n. sp. (*helena*, renamed *becki*); *eucosmia* is obviously also a synonym, although it has fewer spiral striae (cf. *capense*). Probably synonymous with *V. capense*.

Two dead P.F. specimens appear to correspond with the narrow form (*becki*) of *kowieensis*: off Tugela River (Natal), 65–80 fathoms and off Umkomaas (Natal), 40 fathoms (the latter specimen 7·3 × 3 mm.) (S. Afr. Mus. P.F. coll.).

A single specimen from 30° 47′ S. 30° 29′ E., 24 fathoms (U.C.T.), 6 × 2·5 mm., has the protoconch and first two whorls coral pink, the last two maroon with a single narrow white band (actually a series of spots, one on each rib) a little below the periphery.

Mitra distincta (Thiele)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 186, pl. 32 (20), fig. 25.

Scarcely distinct from *kowieensis*. Protoconch 1½ whorls, alt. and diam. 0·75 mm. Postnatal whorls 4, profile shouldered. Axial ribs 11 on 1st whorl, 16 on last whorl; spiral striae 4 on 3rd, 6–7 on last whorl (incl. 1 or 2 obscure on shoulder), crossing ribs, 10–11 additional striae on base. 7 × 3 mm.

35° 16′ S. 22° 26′ E., 155 metres (Thiele); off Cape St. Blaize, 125 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Remarks. The ribs become obsolete on the base, not nodulose as in *kowieensis*. Judging by Thiele's figure the present specimens have more ribs than the *Valdivia* specimens; the latter might be re-examined.

Thiele placed his species in *Turricula* (now *Vexillum*) without, however, having a radula for confirmation.

Mitra bathyraphe Sow.

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 4, pl. 1, fig. 9.
1932. Turton. *Mar. Sh. Port Alfred*, p. 46, pl. 10, no. 348 (*didyma*).

Aperture equal to spire. Protoconch 1½ whorls, alt. and diam. 0·5–0·6 mm. Postnatal whorls 4, profile not shouldered, suture canaliculate, upper edge of whorls slightly undulate or crenulate. Axial ribs 14 on 1st whorl, 16–18 on last whorl, tending to become obsolete on outer lip, subequal to intervals, extending across base; spiral striae 6 on 1st whorl, 9–11 on last whorl, about 12 additional striae on base, becoming stronger anteriorly, intersections with ribs slightly nodulose. Columella pleats 4. 8 × 3·25 mm. Pink.

Kowie (Port Alfred). Off Cove Rock (East London area), 27 fathoms, 3 dead but fresh (S. Afr. Mus. P.F. coll.).

Remarks. The P.F. specimens retain the protoconch, and show the spiral striae crossing the ribs, though they are only feebly impressed on the crest of the ribs. Like beach examples they are pink in colour.

M. didyma is obviously a very worn example of *bathyraphe.*

Mitra canaliculata Sow.

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 4, pl. 1, fig. 10.

Only beach-worn specimens available in S. Afr. Museum, but they seem to confirm the absence of spiral striae, which is a distinguishing feature.

Mitra latruncularia Rve.

1844. Reeve. *Proc. Zool. Soc. Lond.*, p. 181; and *Conch. Icon.*, pl. 21, fig. 166.
1932. Turton. *Mar. Sh. Port Alfred*, p. 45.

Aperture a little shorter than spire (by about length of protoconch and one whorl). Postnatal whorls 5 (perhaps 6). Spiral grooves crossed by axial growth-lines which cause the former to appear punctate (especially in worn specimens), 5 on uppermost whorl, increasing to 7 on body whorl, 13–14 additional grooves on base, becoming deeper anteriorly. Columella pleats 4. 30 × 10 mm.

Purplish- or greyish-brown, with a broad white band at top of whorl and another from top of aperture around middle of last whorl; the whole with irregularly scattered orange-brown spots, which may here and there unite into short axial flames.

Port Elizabeth (Sowerby), Port Alfred (Bartsch, Turton). Jeffreys Bay and Still Bay (S. Afr. Mus.).*

Remarks. One 30 mm. specimen from Jeffreys Bay has only 10 additional spiral grooves on the base (i.e. 17 grooves on the outer lip instead of 20–21). Although only one out of 10 specimens, this shows that variation in the number of grooves occurs, and form a transition to:

var. *albozonata* Turton (1932. loc. cit., p. 45, pl. 10, no. 335), which has 3 spiral grooves on the uppermost whorl, increasing to 5 on body whorl, and 7–8 additional grooves on base (i.e. 12–13 on outer lip). Up to 26 mm. long (apex worn).

Colour as above, but upper white band usually clearer with fewer spots except actually at the suture, second band not so obvious, sometimes whole shell brown with a few white spots along the suture.

Port Alfred (Turton); Jeffreys Bay (S. Afr. Mus.).

M. latruncularia and *albozonata* cannot be separated at a glance by the coloration, but are easily separated by the number of grooves. *M. albozonata*

* A set of beach-worn specimens in S. Afr. Mus. is registered as obtained by E. L. Layard (Curator 1855–72) in 'Table Bay'; but this locality record is unacceptable.

can be regarded at most as only a variety. The original description does not state the number of spiral grooves, and reference to the type is necessary to show which is f. typica and which the variety.

Mitra picta Rve.

1844. Reeve. *Conch. Icon.*, Mitra, pl. 16, fig. 123.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 53.
1932. Turton. *Mar. Sh. Port Alfred*, p. 46, pl. 10, no. 344 (juv.).

Spire less than aperture (juv. to *c.* 15 mm.), equal to (*c.* 20–25 mm.), then $1\frac{1}{4}$ (half-grown) to $1\frac{1}{3}$ (adult) times the aperture. Protoconch 2 whorls, 2 whorls as hatched alt. 1·75 mm., on later juveniles visible portion alt. and diam. 0·75 mm., smooth. Postnatal whorls 6 or 7 (all adults worn). Spiral punctate striae 6 on 1st whorl, increasing to 12 on body whorl, 12–13 additional striae on base (in adult) becoming stronger anteriorly (24–25 on outer lip); fine close-set growth-lines. Columella pleats 4. 40 × 12 mm.

Castaneous with irregular white marks and flames, sometimes a more or less compact white band in middle of body whorl, the upper part of which appears above the suture in preceding whorls. Worn specimens with the latter pattern may appear at first glance like *latruncularia*, but the larger number of spiral striae easily distinguishes them. Protoconch white, brown patches begin to appear on 2nd whorl (*c.* 4 mm. long.).

False Bay to East London.

Remarks. Protoconchs and juveniles from Still Bay in the Muir collection (S. Afr. Mus.). Not taken by the *Pieter Faure*.

Mitra aerumnosa Melv.

Fig. 11(*a*)

1888. Melvill. *J. Conch.*, v, p. 282, pl. 2, fig. 12.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 31 (*simplex*, non Dnkr.).
1919. Cooke. loc. cit., p. 416 (radula).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 185, pl. 32 (20), fig. 22 (*simplex*, non Dnkr.).
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 49.

Aperture subequal to spire. Protoconch 2 whorls, alt. 1 mm., diam. 0·75 mm., smooth. Postnatal whorls 6; spiral series of punctae 8–9 on 2nd whorl, 14–15 on body whorl, 16–18 additional series on base, becoming punctate striae anteriorly; growth-lines feeble, but sometimes strong enough to give a semicancellate appearance on the upper whorls. Columella pleats 4, the lowermost one weak. Periostracum thin. 33 × 11 mm.

Buff with a paler median band on body whorl, sometimes only a series of pale spots, sometimes also a series of pale dashes from the suture downwards, periostracum yellowish, olivaceous, or castaneous.

Radula with *c.* 50 rows, central plate 4 times as wide as long, 8-cuspid, lateral about 6 times as wide as long, 14-cuspid.

Fossil, late Tertiary; Saldanha Bay (Haughton).

Algoa Bay (Sowerby); Table Bay and Dassen Island (S. Afr. Mus.); Natal (S. Afr. Mus.). Living: Oudekraal (west coast of Cape Peninsula) and Langebaan (Saldanha Bay) (U.C.T.).

Remarks. The Natal specimen was received from Col. Bowker, but probably not collected in Natal; Turton did not obtain it at Port Alfred; and even the Algoa Bay record is open to doubt.

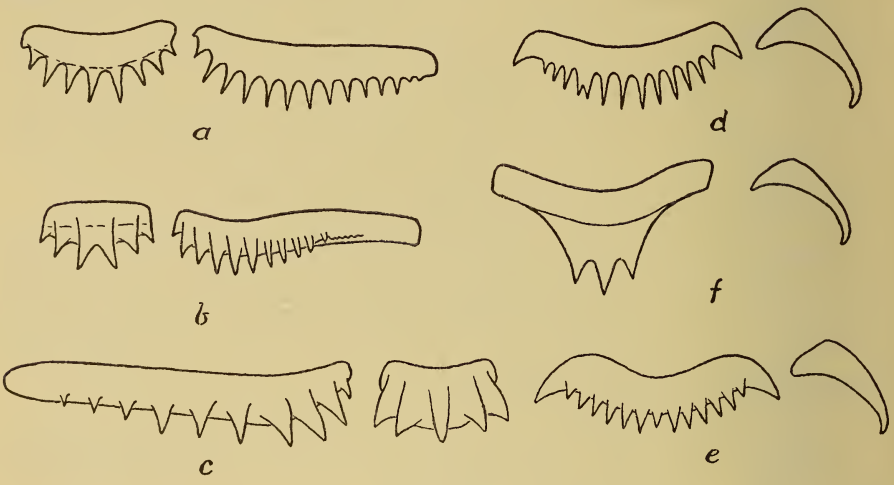


FIG. 11.

Central and lateral radula plates of (*a*) *Mitra aerumnosa* Melv.; (*b*) *M. litterata* Lam.; (*c*) *M.* (*Dibaphus*) *bathybius* n. sp.; (*d*) *Vexillum sculptile* (Rve.); (*e*) *V. capense* (Rve.); (*f*) *Pusia patula* (Rve.).

Thiele disagreed with von Martens's identification of specimens from 34° 51′ S. 19° 37′ E., 80 metres as *simplex* Dnkr.; he figured one but without deciding its specific identity. The figure looks very like an *aerumnosa*.

A series in the Juritz collection (S. Afr. Mus.), probably from the west coast of the Cape Peninsula, contains specimens from 5 mm. long upwards. These show that the lowermost columella pleat does not develop until the shell is 14–16 mm. in length (4 postnatal whorls), and even in adults always remains feeble.

Mitra teretiuscula Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 185, pl. 32 (20), fig. 23.

Spire subequal to aperture. Protoconch 1½ whorls, alt. and diam. 0·75 mm., smooth. Postnatal whorls 5, profile convex, suture deep but not canaliculate; 4–5 (Thiele said a variable number) fine spiral striae, the one

below the suture usually a little more conspicuous than the others, none on base below periphery; growth-lines arcuate. Columella pleats 4. 9·5 × 3·5 mm.

Yellowish with brown markings: an infrasutural and a median band, with zigzag axial flames (Thiele); the present specimens show only the axial flames.

35° 16′ S. 22° 26′ E., 155 metres (Thiele); off Cape St. Blaize, 125 fathoms, 3 dead; off Cape Morgan, 45 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Remarks. The rounded profile of the whorls, and the fewer spiral striae distinguish this species from *aerumnosa*. Moreover the latter is a larger species with only 3 whorls at 9 mm. length. Thiele's figure shows the columella pleats more oblique than in the present specimens.

In slightly worn specimens the uppermost stria (below the suture) persists when the others have become untraceable.

Mitra (*Papalaria*) *episcopalis* Linn.

1833. Quoy & Gaimard. *Voy. Astrolabe. Moll.*, pl. 45, figs. 1–7 (living animal).
1859. Chenu. *Man. Conchyl.*, i, fig. 996.
1880. Von Martens. *Mauritius & Seychellen*, p. 249.
1919. Cooke. loc. cit., pp. 406, 408 (radula).
1935. Dautzenberg. *Mem. Mus. R. Hist. Nat. Belg.*, H.S. II, 17, p. 44 (references).

Radula with 71 rows, central plate 8–9-cuspid, lateral 20–22 cuspid, the cusps diminishing to mere serrations at outer end (Cooke).

Distribution. Mozambique (Smith), Zanzibar, Mauritius, Madagascar, Indo-Pacific.

S. Afr. Mus. has this well-known species from Mozambique.

Von Martens records that the living animal exudes a purple-brown fluid which stains the hands reddish-brown, and smells like green walnuts.

Mitra (*Papalaria*) *pontificalis* Lam.

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 198.
1859. Chenu. *Man. Conchyl.*, i, fig. 1030.
1880. Von Martens. *Mauritius & Seychellen*, p. 250.
1935. Dautzenberg. loc. cit., p. 53, pl. 2, figs. 8, 9 coloured (and var. *confluens*) (references).

Three specimens in the Ross-Frames collection (S. Afr. Mus.) labelled as from Mozambique.

Distribution. Zanzibar, Mauritius, Madagascar, Indo-Pacific.

Mitra (*Strigatella*) *limbifera* Lam.

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 214.
1859. Chenu. *Man. Conchyl.*, i, fig. 1003.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 44 (*carifa*).
1919. Cooke. loc. cit., pp. 410, 411 (radula).
1935. Dautzenberg. loc. cit., p. 88 (*aurantia* var. *l.*) (references).
1936. Peile. loc. cit., p. 142 (radula).

Aperture a little longer than spire. Postnatal whorls 8. Body whorl with 8 spiral grooves, varying in strength, often with fine spiral striae on the flat

ridges, 15–18 additional grooves on base, becoming stronger anteriorly; crossed by close-set slightly retractive growth-lines. Columella pleats 5, the lowermost one usually feeble, sometimes with weak intermediary pleatlets. Periostracum thin. 38 × 16 mm. (S. Afr. Mus.).

Upper whorls and upper half of body whorl yellowish-brown, base darker chestnut brown, periostracum yellowish.

Radula with 86 rows, central plate 7-cuspid, lateral plate with 9–10 short thick cusps, margin external to them bare (Cooke).

Natal (Krauss, Sowerby, S. Afr. Mus.); Durban (Sowerby, Smith, Cooke).

Distribution. Mauritius, Indo-Pacific (*aurantia*), Philippines (*limbifera*).

Remarks. The spiral sculpture varies in strength, and one can speak of 8 spiral grooves or of 4 spiral flat 'cords' with lirae (*carifa*); the spiral grooves are constant on the early whorls, variation occurring on the body whorl; in one specimen the spiral sculpture on the body whorl shows only very faint lirae.

Mitra (Strigatella) litterata Lam.

Fig. 11(*b*)

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 220.
1859. Chenu. *Man. Conchyl.*, i, fig. 1000.
1919. Cooke. loc. cit., pp 410, 411, fig. 6 (radula).
1935. Dautzenberg. loc. cit., p. 103 (references).
1936. Peile. loc. cit., p. 142 (radula).

Aperture twice as long as spire. Postnatal whorls 6. Last whorl with 7 spiral rows of punctae (fewer on early whorls), 15–18 additional rows on base, becoming grooves anteriorly. Columella pleats 4. Outer lip with rounded boss in middle internally. Periostracum thin. 30 × 16 mm. (S. Afr. Mus.).

White with brown axial irregular zigzag or undulate markings, periostracum yellowish.

Radula with *c.* 85 rows, central plate with 6 cusps, outermost cusp on either side small, lateral plate wide with 8–10 cusps, outer third of margin smooth. Anterior quarter of radula yellowish-brown, especially dark in front, hinder three-quarters colourless.

Living: Durban and Kosi Bay (U.C.T.); Delagoa Bay (U.W.).

Distribution. Red Sea, Aden, Mauritius, Indo-Pacific.

Remarks. Cooke gave the number of cusps on the central plate of the radula as 7, but his fig. 6 shows only 5; the outermost one on either side is evidently too minute to show in the figure. Peile said the central plate may have 'one more cusp' (?, i.e. 8). The example here described, from Delagoa Bay, has no median cusp.

Mitra (Strigatella) luctuosa A.Ad.

1844. Reeve. *Conch. Icon.*, fig. 94 (*polita*).
1851. A. Adams. *Proc. Zool. Soc. Lond.*, p. 133.
1880. Von Martens. *Mauritius & Seychellen*, p. 250 and p. 252, pl. 20, fig. 15 (*polita* Rve.).
1919. Cooke. loc. cit., pp. 410, 411 (radula).

Aperture a little shorter than spire. Postnatal whorls 7. Last whorl with 7 spiral punctate grooves (fewer on early whorls), *c.* 12 additional grooves on base, becoming stronger anteriorly. Columella pleats 4. Periostracum thin. 30 × 11 mm. (S. Afr. Mus.).

Chestnut brown, with a pale narrow spiral band a little distance below the suture: between the 3rd and 4th rows of punctae (von Martens: on the 3rd row).

Radula with 81 rows, central plate small, 7-cuspid, outermost cusp on either side very small, lateral plate wide with 7–8 cusps and a long bare margin external to them (Cooke).

Durban (Sowerby, Cooke). Farquhar Island (S. Afr. Mus.).

Mitra (*Scabricola*) *texturata* Lam.

1811. Lamarck. *Ann. Mus. Paris*, xvii, p. 213.
1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 8.
1935. Dautzenberg. *Mem. Mus. R. Hist. Nat. Belg.*, H.S. II, 17, p. 84, pl. 3, fig. 5 coloured (references).

A specimen in S. Afr. Mus. collected by L. E. Kent on the Natal south coast (between Durban and Port Shepstone) confirms Sowerby's record from Durban. It is slightly worn but retains the coloration (cf. Dautzenberg). The species is therefore presumably an inhabitant of South African waters.

Distribution. East Indies, Philippines.

Mitra (*Scabricola*) *crenifera* Lam.

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 204.
1911. Schepman. *Siboga Exp. monogr.*, xlix, 1, p. 271, pl. 23, fig. 3 (radula).
1936. Peile. loc. cit., p. 143 (radula).

Aperture slightly longer than spire. Protoconch 2 ($2\frac{1}{2}$) whorls, alt. and diam. 0·75 mm., smooth. Postnatal whorls 7, profile slightly and evenly convex. Axial ribs *c.* 20 on 1st and 2nd whorls, 24 on 3rd, increasing to *c.* 60 on 6th, and very numerous on last whorl, especially on back of outer lip, arcuate, separated by narrow grooves, extending across base; crossed by spiral lirae, 3 on 1st and 2nd whorls, 4 on 3rd and 4th, increasing to 10 on last whorl, some of them with a subsidiary narrow lira, *c.* 14 additional lirae on base; sculpture cancellate, formed of small squares on most of the surface, but of axial oblongs on last whorl, mostly smooth but slightly nodulose on base. Columella pleats 4. 42 × 14·5 mm., width of 3rd whorl 2·75–3 mm. (contrast *circula*, *rufescens*).

Cream or buff, with pale orange irregular spots below the suture, lower half of whorl brown with curved retrorse flames projecting upwards, base with a similar brown band with projections, columella glaze with orange margin.

Radula with *c.* 60 rows, central plate about twice as broad as long, with 2 strong cusps flanked by 2 smaller ones on either side, lateral plate $2\frac{1}{2}$ times as broad as long, with 4 strong cusps on inner half, external half of margin bare (Schepman, Peile).

Durban (Sowerby); Delagoa Bay, fresh, presumably living, but no specimen with animal (U.W.).

Off Umhlanga River (Natal), 22–26 fathoms, 1 dead, 18 mm.; off Umkomaas (Natal), 40 fathoms, 1 broken, but with protoconch, 12 mm. (S. Afr. Mus. P.F. coll.).

Distribution. Indian Seas, Philippine Islands, Fiji, Ceylon, Nicobars, Andamans, Mauritius.

Remarks. I am indebted to Mr. A. E. Salisbury for the identification of this species.

The apical whorls increase in width more rapidly than in *circula*, *rufescens*, *acutilirata*.

Mitra '*circulata* Kien. var.'

1919. Cooke. loc. cit., p. 415 (radula).

Radula with *c.* 73 rows, central plate square, with 2 strong cusps flanked on either side by 2 small obscure denticles; lateral plate transversely oblong, with 4–5 cusps (Cooke).

Remarks. The radula described by Cooke from a Durban specimen corresponds so closely with that of *crenifera* that it raises the suspicion that it was extracted from a *crenifera* and not from one of the shells later described as *burnupiana* (see p. 49).

Mitra flammea Q. & G.

1833. Quoy & Gaimard. *Voy. Astrolabe Moll.*, p. 659, pl. 45 *bis*, figs. 23–5 (living animal).
1844. Reeve. *Proc. Zool. Soc. Lond.*, p. 173 (*interlirata*).
1919. Cooke. loc. cit., p. 413, fig. 11 (radula), and p. 414 (*interlirata*) and footnote (synonymy).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 185 (*flammigera*).

Remarks. Smith (1903. *Proc. Mal. Soc.*, v, p. 366) records *flammigera* from 'Kalk Bay (Burnup)'. Some error seems to have occurred, because it is very unlikely that this Indo-Pacific species extends (certainly not living) as far west as Kalk Bay on the east side of the Cape Peninsula. Probably the collector's name (Burnup) should refer to the locality Durban, not to Kalk Bay.

Mitra rufescens A.Ad.

Fig. 12(*b*)

1851. A. Adams. *Proc. Zool. Soc. Lond.*, p. 137.
1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 9 (? if distinct from *circulata* [= *circula*]).

Aperture subequal to spire. Protoconch ? (corroded). Postnatal whorls 7. Spiral lirae 3 on all whorls, but on 6th and 7th a 4th low down and almost concealed in the suture, a weaker intermediary lira between each pair on 5th–7th whorls, and 1–2 striae on last whorl (or the lowermost intermediary

lira may be duplicated); lirae cut by 15–16 narrow axial grooves on 2nd whorl, increasing to *c.* 24 on 5th, and *c.* 50 on last whorl; sculpture cancellate with squares on early whorls and axial oblongs on later whorls, but spiral lirae predominant. Columella pleats 3, sometimes a feeble 4th. 26 × 9 mm., width of 3rd whorl 1·5–1·75 mm.

Buff, more or less rufescent, possibly due to staining (iron stanchions, etc., in Durban harbour).

Durban (Sowerby; also S. Afr. Mus. ex coll. Ross-Frames, fresh, presumably living).

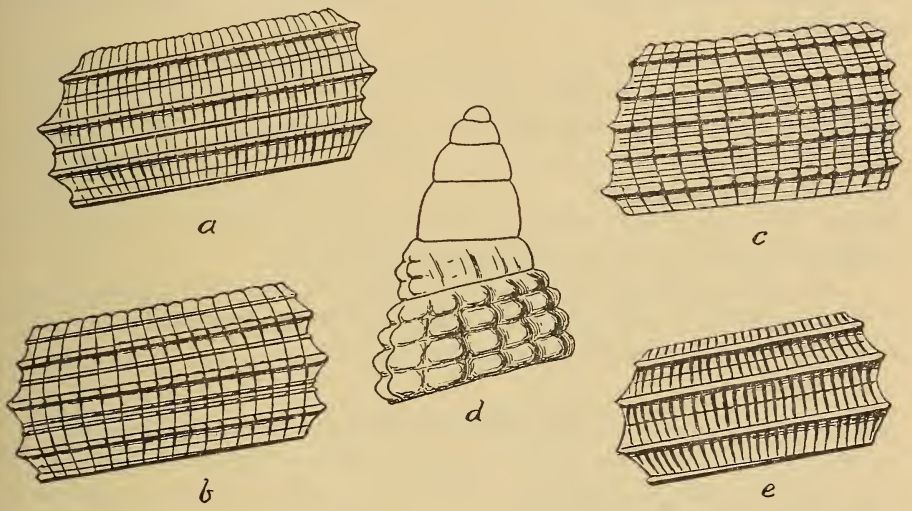


Fig. 12.

One whorl (semi-diagrammatic) of (*a*) *Mitra circula* Kien.; (*b*) *M. rufescens* A. Ad.; (*c*) *M. acutilirata* Sow.; (*e*) *M. foveolata* Dnkr.; (*d*) protoconch and first two postnatal whorls of *M. acutilirata* Sow.

Mitra acutilirata Sow.

Fig. 12(*c*), (*d*)

1874. Sowerby. *Thes. Conch.*, iv, sp. 129, pl. 15, figs. 273, 274.
1936. Peile. loc. cit., p. 142 (radula).

Aperture subequal to spire. Protoconch 4 whorls, somewhat lopsided, alt. 0·8, diam 0·6 mm., smooth. Postnatal whorls 8. Spiral lirae 3 at start of 1st whorl, 4 on each of 2nd–6th whorls, 5 on 7th and 8th whorls, 7–8 additional lirae on base; these main lirae rather sharply subcarinate, between them 1–3 striae and sometimes a weaker intermediary subcarinate lira on last whorl; lirae cut by 13–14 narrow axial grooves on 2nd whorl, increasing to *c.* 22 on 5th and 45–50 on last whorl; sculpture cancellate with small squares and axial oblongs. Columella pleats 4, the lowermost one feeble. 26 × 9 mm., width of 3rd whorl 1·5–1·75 mm.

Dull greyish, a brownish band around middle of body whorl, with some irregular flame-like expansions above (cf. *crenifera*), the main lirae with small brown spots on their crests.

Radula of the *Mitra* (s.s.) form, central plate with *c.* 10 cusps, lateral plate very wide, with cusps throughout its width (Peile).

Delagoa Bay, 1 juv. (S. Afr. Mus. coll. K.H.B. 1912); same locality, 3 (U.W.).

Distribution. Farquhar Island (S. Afr. Mus. coll. E. L. Layard, on board H.M.S. *Castor*, 1856); Mauritius, Indo-Pacific.

Remarks. I am indebted to Mr. A. E. Salisbury for the identification of this species.

A Philippine specimen 37 × 13 mm. (S. Afr. Mus. ex coll. Ross-Frames) named *scabriuscula* Linn. (by Sowerby & Fulton) agrees with the above description except there are 5 main lirae on 5th whorl, 6–7 on 6th, 7–8 on 7th whorl. The increase of the intermediary lirae to become main lirae is scarcely of specific importance; but I am not able to decide the validity of Sowerby's species, and accept Mr. Salisbury's identification. Neither *scabriuscula* nor *acutilirata* has hitherto been recorded from South Africa.

Three dead juveniles from off O'Neil Peak (Zululand), 90 fathoms (S. Afr. Mus. no. A8811. P.F. coll.) may be this species, but the axial grooves are more numerous than in the other specimens at hand.

Mitra (*Cancilla*) *circula* Kien.

Fig. 12(*a*)

1839. Kiener. *Spec. Coq. Mitra*, p. 21.
1919. Cooke. loc. cit., p. 417 (radula).
1921. id. *Proc. Mal. Soc.*, xiv, p. 114, fig. 2 (*burnupiana*).
1936. Peile. loc. cit., p. 143, fig. 9 (radula).

Aperture subequal to spire. Protoconch 3½ whorls, diam. 0·6, alt. 0·75 mm. Postnatal whorls 8. Spiral lirae 3 on each whorl, from 4th or 5th onwards a 4th lira low down and partly concealed in the suture, 1–3 striae and sometimes a subsidiary lira above 1st lira, 1–2 striae between each pair of main lirae and sometimes 2 lirae between 3rd and 4th lirae, 7 (8) additional lirae on base, with intermediaries; lirae cut or nicked by numerous close-set axial striae, 15–16 on 1st whorl, 19–20 on 2nd, increasing to at least 60 on 7th and more on 8th whorl; sculpture cancellate with small squares and axial oblongs, lirae predominant. Columella pleats 3 with an obscure 4th. 31·5 × 10 mm., width of 3rd whorl 1·75–2 mm.

White or buff, lower half of whorls faintly orange.

Radula with arcuate central plate, lateral plate transversely elongate, both plates with numerous denticles or cusps (Cooke, Peile).

Inner harbour, Durban (S. Afr. Mus. coll. Ross-Frames); Cape Natal, 54 fathoms, 1 broken apex (S. Afr. Mus. P.F. coll.); Delagoa Bay (U.W.).

Remarks. Except for the development of more numerous axial striae, there seems little difference between the specimens here referred to *circula* and those referred to *rufescens*.

The status of the name *burnupiana* depends on the shell alone, because the description was based on the shell and was accompanied by a figure (albeit diagrammatic). It is here treated as a synonym.

The distinctions (Cooke, 1921) between *circula* and *burnupiana*, both found together in Durban Bay, are not very convincing. Plump and slender individuals occur in many Gastropods. The incidence of the line joining the columella pleats (see Burnup's diagram in Cooke, 1921) depends on the angle from which the shell is viewed, and in any case may be vitiated by a very slight curvature in the columella, or the variable development of the pleats.

It seems most unlikely that there should be two species living together which are scarcely distinguishable conchologically, but which have quite dissimilar radulae (see p. 45, *crenifera*).

Mitra foveolata Dnkr.

Fig. 12(*e*)

1863. Dunker. *Novitat. Conch.*, p. 46, pl. 15, figs. 5, 6.

Fusiform. Spire $1\frac{1}{4}$ in aperture. Protoconch ? 3 whorls (broken). Postnatal whorls 8. Spiral lirae 3 on each whorl, from 4th onwards a 4th lira low down and partly concealed in the suture, an impressed stria (sometimes two striae) between each pair of lirae, between 3rd and 4th lirae a weak intermediary lira, *c.* 10 additional main lirae on base, sometimes with intermediaries between the upper 6 or 7 lirae; lirae cariniform, uninterrupted; between the lirae close-set axial striae, often subfoveolate underneath each lira. Suture slightly canaliculate. Columella pleats 4, the 4th feeble, but sometimes a feebler 5th pleat. 25 × 9–10 mm.

Pale buff (sometimes stained orange-rufous) with irregular orange-brown axial streaks or flames.

Durban (S. Afr. Mus. ex coll. Ross-Frames); Delagoa Bay (S. Afr. Mus. coll. K.H.B., 1912).

Remarks. The identification of this species also I owe to Mr. Salisbury.

The continuous carinate lirae, not cut by the axial striae, distinguishes the species from the others here recorded as *acutilirata*, *rufescens*, *circula*. Watson's figure of *rufescens*, however (1886. *Challenger Rep.*, xv, pl. 14, fig. 5), shows a similar sculpture.

Von Martens in 1880 (*Mauritius & Seychellen*, p. 251) gave this species as a synonym of *interlirata* Rve. 1844, and in 1903 (*D. Tiefsee Exp.*, vii, p. 106) as a synonym of *flammigera* Rve.

Mitra (*Swainsonia*) *ocellata* (Swains.)

1831. Swainson. *Zool. Illustr.* (2), ii, pl. 54 (*Mitrella o.*).
1854. H. & A. Adams. *Gen. Rec. Moll.*, i, p. 180 (*Swainsonia o.*).

Fusiform. Aperture slightly longer than spire. Protoconch broken. Postnatal whorls 7. Spiral punctate striae 3 on 1st whorl, 4 on 2nd, increasing to 5 on last whorl, 9 additional striae on base, not becoming stronger anteriorly; fine close-set axial growth-lines. Columella pleats 5; a narrow parietal callus from top of aperture to 1st pleat; outer lip slightly thickened. 27 × 9·5 mm.

Pale fawn with irregular white marks which are flame-like on upper whorls, then breaking up into arrows and triangles, resembling on the body whorl the pattern of a 'textile' cone.

Natal (S. Afr. Mus. received from a private collector, the locality therefore not certain; also a worn specimen from the coast between Durban and Port Shepstone collected by L. Kent).

Distribution. East coast of Africa, Singapore.

Remarks. The shell is apparently not much worn although highly polished. The body whorl has three times suffered injury and been repaired; this may account for the 5th columella pleat (though 5 pleats is usual in *Swainsonia*); at two of the breaks the outer lip shows a slight narrow thickening before the continuation of growth.

M. fissurata Lam., of which *ocellata* has been considered a variety (Tryon. Man. Conch.) occurs at Mauritius and Seychelles (1880. Von Martens. *Maurit. & Seych.*, p. 249); *ocellata* is dintinguished by the punctate-striate sculpturing (A. E. Salisbury in litt. 1957).

Mitra (*Callithea*) *subulata* (Lam.)

Fig. 13(*a*)

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 211.
1859. Chenu. *Man. Conchyl.*, i, fig. 1019.

Slender, fusiform, profile of spire straight. 6 whorls preserved (protoconch and ? 2 whorls missing). First 4 preserved whorls each with 4 spiral striae; 5th whorl with 6, 6th with 2 plus 4 (or 5) indistinct striae. On the 4th, 5th and 6th whorls the uppermost stria is better developed than the others, forming a *Terebra*-like groove. Indications of numerous low rounded, close-set axial ribs on last 2 or 3 whorls, more distinct above the spiral groove than below it, and making the suture undulate or crenulate. 16 or 17 additional striae on base, becoming stronger anteriorly. Columella pleats 4. 25·5 × 8 mm., aperture 12 mm.

Off O'Neil Peak (Zululand), 90 fathoms, one dead and partly corroded (S. Afr. Mus. no. A8763. P.F. coll.).

Remarks. Somewhat similar in shape to *picta* and *aerumnosa*, but the distinctive feature is the *Terebra*-like spiral groove.

Mitra (*Dibaphus*) *bathybius* n. sp.

Figs. 11(*c*), 13(*b*)

Protoconch 2 whorls, alt. 1, diam. of 1st whorl 1, of 2nd whorl 1·5 mm., smooth. Postnatal whorls 4 (preserved), with cancellate sculpture; 1st whorl at beginning with close-set axial riblets (some of which may belong to the protoconch), later with in addition 4 spiral striae; arcuate axial ribs *c.* 20. on 1st whorl, 20 on 2nd, 23 on 3rd, and 25 on 4th whorl, distinct and sharp on first three whorls, becoming feeble on 4th and indistinct towards outer lip; spiral striae 5 on 2nd, 6 on 3rd, 7 on 4th whorl, crossing the ribs, broader and deeper (almost grooves) on upper part of whorl than on lower part; 10 additional grooves on base (*c.* 20 including those on rostrum). No columella pleats. No operculum.

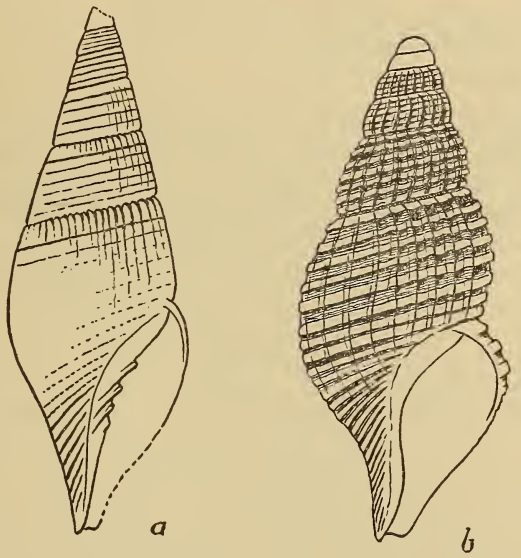


Fig. 13.
(*a*) *Mitra* (*Callithea*) *subulata* Lam. (*b*) *Mitra* (*Dibaphus*) *bathybius* n. sp.

Radula with 60 rows, central plate with 5 cusps, a tiny cusp or denticle at side not traceable, lateral plate with 10 cusps, a small one at inner end, followed by 3 large ones, the other 6 farther apart and decreasing in size.

Off Cape Natal, 440 fathoms, 1 alive and one fragment (S. Afr. Mus. A8827. P.F. coll.).

Remarks. Very fortunately this shell, although preserved dry for 57 years in a bottom-sample, contained a well-preserved animal; presumably the sample had originally been preserved in formalin. Owing to the likeness of the shell to Tomlin's description and figure of *Charitodoron pasithea* (p. 146) it was unexpected to find the animal possessed a Mitrid radula.

The radula resembles that of *M.* (*Dibaphus*) *edentula* (see: Cooke 1919); the shell, however, is very different in appearance from that of *edentula*.

It seems safer not to include the genus *Charitodoron* in the *Mitridae*, but to wait until the radula of an undoubted species of this genus has been obtained.

Gen. Vexillum Bolten-Röding

(syn: *Turricula* Klein)

Fusiform or turriform. Radula with arcuate, multicuspid central plate, and simple falcate lateral plate.

Vexillum alauda (Sow.)

1874. Sowerby. *Thes. Conch.*, iv, pl. 361, figs. 134, 135.
1903. Smith. *Proc. Mal. Soc.*, v, p. 367.
1919. Cooke. loc. cit., p. 418 (radula).

Narrow fusiform. Aperture a little shorter than spire. Protoconch ? Postnatal whorls 9. Axial ribs 14–15 on 1st whorl, 16–17 on 2nd, from the 5th or 6th whorl decreasing to 13 on the last whorl, thin, straight, slightly shouldered on body whorl, descending to base, not crossed by spiral striae; spiral striae 3–4 on 1st and 2nd whorls, increasing to 6–7 on last whorl, some of them double, *c.* 15 additional ones on base becoming grooves anteriorly; well impressed on early whorls, but becoming feebly so on later whorls. Columella pleats 4. Outer lip feebly plicate internally. 40 (protoconch and 3 whorls missing) × 13 mm.

Fawn or grey, upper half of whorls with a brown band, bordered below by a narrow line, a second brown band at bottom of whorl partly concealed in suture, but clear on body whorl as far as outer lip, base anteriorly brownish; half-grown specimens chestnut brown, with or without the pale yellowish line; some specimens bluish-grey with two series of orange-brown spots on the ribs.

Radula, central plate with 16–17 denticles (Cooke).

Durban (Smith; and S. Afr. Mus); Inhambane, Portuguese East Africa (U.C.T.).

Distribution. Mauritius.

Remarks. The specimens from the Morrumbene estuary, Inhambane, are discoloured and corroded, but one retains the two series of brown spots on the ribs.

Vexillum exasperatum (Gmelin)

1790. Gmelin in *Linn. Syst. Nat.*, ed. 13, i, p. 3453 (*Voluta e.*).
1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 219 (*arenosa*).
1911. Schepman. *Siboga Exp. monogr.*, xlix, 1, p. 287 (*torulosa* as synonym, *arenosa* as variety).
1919. Cooke. loc. cit., p. 418, fig. 17 (radula), and p. 418 (*arenosa*).
1935. Dautzenberg. loc. cit., p. 148 (with vars. *torulosa* and *arenosa*) (references).
1936. Peile. loc. cit., p. 143, fig. 10 (radula).

Cooke figured the central plate of the radula of *exasperatum* with 15–16 denticles; Peile's figure shows 19 cusps, the median one the largest; and Cooke gave 20–22 denticles for *arenosum*.

Durban (Sowerby); Delagoa Bay (U.W.); Mozambique Island (S. Afr. Mus. coll. K.H.B. 1912).

Distribution. Red Sea, East Africa, Indo-Pacific.

Remarks. Two broken specimens were identified by Tomlin as *arenosa*. They do not exactly correspond with specimens from New Caledonia identified as this species by Sowerby & Fulton.

Vexillum torulosum (Lam.)

1811. Lamarck. *Ann. Mus. H. N. Paris*, xvii, p. 216.
1859. Chenu. *Man. Conchyl.*, i, fig. 1014.

Turreted. Aperture a little shorter than spire. Protoconch ? Postnatal whorls 6 (? 7), profile angularly shouldered. Axial ribs 15 on the apical two whorls (probably the 2nd and 3rd), decreasing to 11 on last (6th or 7th) as wide as intervals on early whorls, much narrower on later whorls, extending across base; crossed by 2 spiral striae on early whorls, increasing to 4 on 4th (? 5th) and 12 (5 above, 7 below shoulder) on last whorl, 10 additional striae on base before the costate rostrum which has 3–4 lirae; growth-lines increasing in strength and forming a cancellate sculpture on later whorls. Columella pleats 4. 22 (apex missing) × 11·5 mm.

Uniform dull fawn.

Delagoa Bay, one dead but fresh (U.W.).

Remarks. The specimen corresponds with Chenu's figure, and is quite distinct from the specimens identified by Tomlin as *arenosum*.

Vexillum daedalum (Rve.)

Fig. 14(*a*)

1845. Reeve. *Proc. Zool. Soc. Lond.*, p. 54; and *Conch. Icon.*, Mitra, pl. 34, fig. 281.
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227.
1911. Schepman. *Siboga Exp. monogr.*, xlix, 1, p. 285.

Aperture 1⅓ in spire. Protoconch broken. Postnatal whorls 8, sutures deep but not canaliculate. Axial ribs 11 on 1st whorl, increasing to 15–17 on last whorl, moderately sharp, extending across base, intervals bluntly V-shaped; spiral grooves in the intervals 5 on 2nd whorl, increasing to 7 on last whorl, 8–9 additional grooves on base, deeply impressed in the intervals but not crossing the ribs except on lower part of base where they cause the ribs to be slightly nodulose. Columella pleats 4; a nodular parietal callus at top of aperture. Outer lip plicate within. 19 × 7 mm.

Pale orange-brown (probably faded), a white band at top of whorl (below the suture) and another at bottom of whorl (above suture), and one or two on base of body whorl.

Off Scottburgh (Natal), 92 fathoms, dead shells (Sowerby).

Off Umhlangakulu River (Natal), 50 fathoms, 2 dead (seen by Sowerby); off O'Neil Peak (Zululand), 55 fathoms, 2 dead (S. Afr. Mus. P.F. coll.).

Distribution. Philippine Islands, East Indies.

Remarks. Having no authentic *daedalum* for comparison, I accept Sowerby's identification of two Natal examples (S. Afr. Mus. no. A3482), returned by him but from a locality different from that which he recorded (1903). He did not state the number of P.F. specimens received by him. One wonders whether perhaps the two specimens included in a collection 'from South Africa' in the United States National Museum, and described by Bartsch as *helena*, were P.F. specimens (see p. 55).

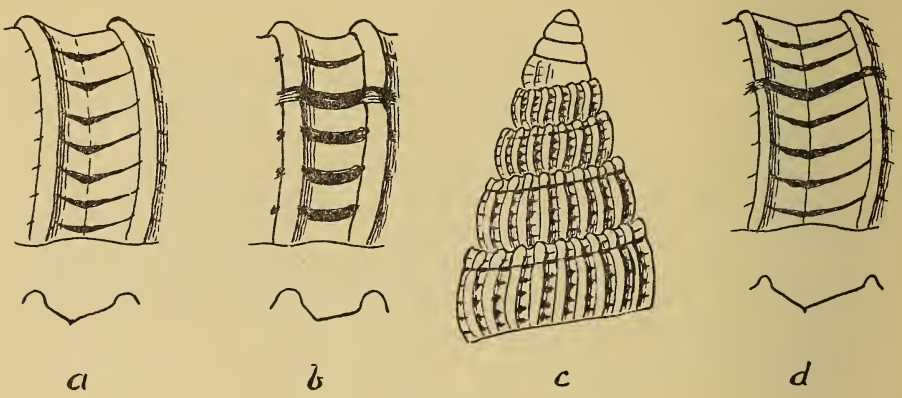


Fig. 14.

Sculpture (semi-diagrammatic) of (*a*) *Vexillum daedalum* (Rve.); (*b*) *V. sculptile* (Rve.); (*d*) *V. discoloria* (Rve.); (*c*) protoconch and first four postnatal whorls of *Vexillum* sp. (S. Afr. Mus. no. A8813).

An axial stria is sometimes present at the bottom of the V-shaped intervals; and the V is not always symmetrical, the bottom being nearer to the following rib than to the preceding rib. cf. *discoloria.*

Vexillum sculptile (Rve.)

Figs. 11(*d*), 14(*b*)

1845. Reeve. *Proc. Zool. Soc. Lond.*, p. 55; and *Conch. Icon.*, Mitra, pl. 35, fig. 290.
1874. Sowerby. *Thes. Conch.*, iv, Mitra, p. 34, pl. 26, fig. 596.
1886. Watson. *Challenger Rep.*, xv, p. 251.
1911. Schepman. *Siboga Exp. monogr.*, xlix, 1, p. 286.

Seven specimens from Delagoa Bay differ in the following respects. Aperture 1¼ in spire. Postnatal whorls 8–9. Axial ribs 15–16 on 1st whorl, increasing to 26–30 on last whorl, not very sharp, extending across base, intervals more or less V-shaped, narrower than in *daedalum*; spiral grooves in the intervals 4 on 2nd whorl, increasing to 5 (6) on last whorl, 8–9 additional

grooves on base, deeply impressed in the intervals (in the largest specimen, which has 30 ribs, they are more like pits than grooves), not crossing the ribs except on lower part of base where the ribs are slightly nodulose; the 2nd groove from the top of whorl is the deepest, usually cutting the ribs and forming, especially on the early whorls, a *Terebra*-like continuous spiral groove. Columella pleats 4; a nodular parietal callus at top of aperture. Outer lip plicate within. 21 × 7 mm.

Upper half of whorls more or less brown, lower half cream, base brown.

Radula (only one available) with 55 rows, central plate concave in front, with 13 cusps between the acute postero-lateral angles, lateral plate falcate. Two of the cusps on the central plate often united to form a single apically bifid cusp, the fusion not occurring on every plate, and not in the same position.

Inhaca Island, Delagoa Bay, 2 living and 5 dead (S. Afr. Mus. coll. K.H.B. 1912).

Distribution. East Indies, Philippine Islands.

Remarks. Bartsch (1915. *Bull. U.S. Nat. Mus.*, 91, p. 43) described *Mitra helena* based on two specimens from 'South Africa', originally sold by Sowerby & Fulton as *daedalum*. Bartsch said *helena* (15 × 6·6 mm.) was smaller (how much smaller?) than the Philippine *daedalum*. The description gave the numbers of axial ribs as 16 on 1st whorl, 20 on 2nd, and 16 [*sic*] on the last; if 16 is a typ. err. for 26, the numbers correspond with those of the Delagoa Bay specimens better than with those of the specimens here recorded as *daedalum*.

Vexillum sp.

Fig. 14(*c*)

A single specimen in fresh condition taken off Cape Natal (Durban), 54 fathoms (S. Afr. Mus. no. A8813. P.F. coll.) is closely allied to *daedalum*, and may be referable to *sculptile*, but is much more slender.

Narrow fusiform. Aperture 1½ in spire. Protoconch 3½ whorls, slightly lopsided, alt. 0·75, diam. 0·5 mm., smooth. Postnatal whorls 7½. Sutures deep, but not canaliculate. Axial ribs 11–12 on 1st whorl, increasing to *c.* 22 on 4th and *c.* 33 on last whorl, subequal in width to the intervals, extending across base; spiral striae 3–4 on 1st whorl, from 2nd whorl onwards the uppermost stria becomes groove-like, more deeply impressed, and cuts the ribs, followed by 4 striae, forming rather deep pits in the intervals but scarcely cutting the ribs; from 4th whorl onwards an additional feeble stria is developed between the suture and the deeply impressed stria; 7 additional striae on base. Columella pleats 4; a feeble nodular parietal callus at top of aperture. Outer lip plicate within. 15 × 4·5 mm. (probably not quite fully grown).

White, a very faint trace of a yellowish band below suture and another on lower part of base of body whorl.

Vexillum discoloria (Rve.)

Fig. 14(*d*)

1845. Reeve. *Proc. Zool. Soc. Lond.*, p. 46; and *Conch. Icon.*, Mitra, pl. 29, fig. 230.
1880. Von Martens. *Mauritius & Seychellen*, p. 255 (*discolor* [*sic*]).

Two P.F. specimens were identified by Sowerby as this species, but the record was not published.

Fusiform; aperture $1\frac{1}{3}$–$1\frac{1}{2}$ in spire. Protoconch broken. Postnatal whorls 7. Sutures deep but not canaliculate. Axial ribs 11 on 1st whorl, increasing to 15–16 on last whorl, rather sharp, much narrower than the more or less V-shaped intervals, extending across base; a fine axial stria along the bottom of the intervals, which is sometimes asymmetrical (cf. *daedalum*); spiral striae 5 on 2nd whorl, 7 on last whorl, *c.* 14 additional striae on base, strongly marked in the intervals, not cutting the ribs except on base where the intersected ribs are slightly nodulose; on 1st–3rd whorls the stria next the suture is the deepest, at 4th whorl a weaker stria is interpolated, and on 5th and 6th whorl 2 striae; thus the 1st, then the 2nd, and ultimately the 3rd stria is the strongest and most deeply impressed, forming a *Terebra*-like spiral groove, especially noticeable on the early whorls. Columella pleats 3, with an obscure 4th anteriorly. Outer lip plicate within. 12·5 × 4·5 mm.

Pale brown, slightly darker in the intervals, with a white band around *middle* of whorl, and two other bands on the base.

Off Umvoti River (Natal), 27 fathoms, 2 dead but fresh (S. Afr. Mus. P.F. coll.).

Distribution. Mauritius, Réunion (von Martens).

Remarks. Reeve's description (I have not seen his figure) does not quite fit the present specimens except as regards the colour: 'fasciis roseis et albis alternata, fasciis roseis inter costas ustulato-nigricantibus'.

Vexillum capense (Rve.)

Fig. 11(*e*)

1845. Reeve. *Conch. Icon.*, Mitra, pl. 33, fig. 268.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 53 (listed) (*Turricula* (*Pusia*) *c.*).
1910. Schwarz. *Tr. Geol. Soc. S. Afr.*, xii, p. 115.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 44, pl. 21, fig. 4 (*ima*).
1932. Turton. *Mar. Sh. Port Alfred*, p. 47, pl. 10, no. 354; and p. 47 (*ima*).
1932. id. ibid., p. 48, pl. xi, no. 356 (*albanyana*).
1932. id. ibid., p. 48, pl. xi, no. 357 (*hera*).

Aperture a little shorter than spire. Protoconch $1\frac{1}{2}$ whorls, alt. 0·5, diam. 0·6–0·7 mm., smooth. Postnatal whorls 5. Axial ribs 11–12 on 1st and 2nd whorls, 14–15 on body whorl, narrower than the intervals (in fresh specimens), extending across base (in fresh specimens); spiral striae in the intervals 7 (8–9), not crossing the ribs, often not conspicuous, 11–12 additional striae on base,

but usually only the 5–6 stronger anterior ones conspicuous. Columella pleats 4. 11·5 × 5 mm. (Turton: 15 mm. long.).

Pale fawn, with a darker orange-brown band, sometimes mottled, above a white peripheral band, base orange-brown more or less spotted with white; the white band is usually suffused in the middle so that an upper and a lower band of pure white is formed; the axial grooves also are often suffused, which produces a 'necklace' effect of white spots on the ribs, and the upper necklace is bordered below by a narrow brown line (cf. Bartsch's figure of *ima*).

Radula, one specimen examined but presumably incomplete because only 20 rows were obtained, central plate strongly arcuate in front, with 13 cusps between the acute postero-lateral angles, lateral plate falcate.

Fossil: Pleistocene, Port Elizabeth (Schwarz).

Living: False Bay (U.C.T.).

Dead: Kalk Bay (False Bay) to Port Alfred (auct. et S. Afr. Mus.); Tongaat (30 miles north of Durban) (S. Afr. Mus.); Still Bay (U.C.T.).

Off Nanquas Peak (eastern part of Algoa Bay), 63 fathoms, 3 dead; off Cove Rock (East London), 22 fathoms, 1 juv. (S. Afr. Mus. P.F. coll.).

Remarks. Although Dunker is quoted as author by Krauss, Sowerby (1892), Bartsch, and Turton, the species should be credited to Reeve (see Sherborn. *Index Anim.*).

Neither Bartsch nor Turton seems to have realized that *ima* is merely a worn specimen of *capensis*. Among a large number of beach-worn specimens two or three can usually be found which have reached the right stage of abrasion. The same applies to *albanyana* and *hera*.

Under *capensis* Turton (p. 47) mentions *rufocincta* Adams 1851 as a 'variety (or synonym)'; see *euzonata* (p. 38).

Sometimes only 4 or 5 well-spaced spiral striae are visible in the intervals, e.g. the 3 P.F. specimens, and one out of about 50 specimens from Still Bay (S. Afr. Mus.). A similar reduction in the number of spiral striae occurs in a specimen of *eucosmia* Turton = *kowieensis* (p. 39).

Gen. Pusia Swainson

Fusiform. Radula with arcuate, tricuspid central plate, and simple falcate lateral plate.

Pusia patula (Rve.)

Fig. 11(*f*)

? 1840. Küster in *Mart. Chemn. Syst. Conch. Cab.*, p. 108, pl. 17*a*, figs. 4–6 (*pruinosa*) (*fide* von Martens, 1903).
? 1845. Reeve. *Proc. Zool. Soc. Lond.*, p. 49; (*M. pica*) and *Conch. Icon.*, Mitra, pl. 31, fig. 247.
1845. id. ibid., p. 61; and ibid., pl. 39, fig. 333 (*M. patula*).
1846. Dunker. *Zeitschr. Mal.*, iii, p. 111 (*simplex*).
1848. Krauss. *Südafrik. Moll.*, p. 125, pl. 6, fig. 20 (*simplex*).
1889. Sowerby. *J. Conch.*, vi, p. 8, pl. 1, fig. 11 (*merula*).
1903. Smith. *Proc. Mal. Soc.*, v, p. 366 (*pica* and *patula*).

? 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 31 (*simplex*, ? non Dnkr.).
1906. Smith. *Ann. Natal Mus.*, i, p. 33 (*simplex*; removes the Tasmanian *cinnamomea* from the synonymy).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 45 (*merula*, *simplex* and *patula*).
1916. Sowerby. *Ann. Mag. Nat. Hist.* (8), xviii, p. 491, text-fig. (*fidis*).
1922. Peile. *Proc. Mal. Soc.*, xv, p. 94, fig. 4 (radula) (*merula*).
? 1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 185, pl. 32 (20), fig. 22 (? *simplex*, disagrees with von Martens 1903).
1925. id. ibid., p. 186, pl. 32 (20), fig. 24 (*hottentota*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 45 (*merula*); p. 45, pl. 10, no 337 (*lurida*); p. 45, pl. 10, no. 338 (*fidis*); p. 46 (*patula*, *pica* and *simplex*); p. 46, pl. 10, no. 340 (*simplex* var. *alfredensis*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 100, fig. 37 (radula) (*patula*).

Ovate-fusiform. Aperture about $1\frac{1}{3}$ times the spire. Protoconch 2 whorls, alt. and diam. 0·5 mm., smooth. Postnatal whorls 6–7. First whorl at start with some fine axial pliculae, following whorls smooth, feebly or distinctly ribbed, when present 12–14 ribs on 4th and 15–18 on last whorl; fine spiral striae 3 on 1st whorl, increasing to 5 or 6 on upper part of whorls, minutely crinkly (due to growth-lines) if whorls smooth, visible only in the intervals when the whorls are ribbed; usually no striae visible on periphery, but 4–5 may appear on lower half of whorls; in fresh examples the striae probably cross the ribs; on base 15–18 additional striae, usually visible only on lower part where they separate *c.* 10 lirae. Columella pleats 4. 17·5 (apex worn) × 6·5 mm.

Various shades of brown, sometimes very dark, almost black, often with a white mark on outer side of outer lip, or with a white interrupted spiral band in middle of whorl; some specimens mottled.

Radula with *c.* 70 (Peile: 64–67) rows, central plate arcuate, tricuspid, lateral plate falciform. The shape of the lateral plate seems to vary; my examples are intermediate between Peile's figures of *merula* (1922) and *patula* (1938).

From Durban along the south coast and around the Cape Peninsula up to Port Nolloth on west coast.

35° 16′ S. 22° 26′ E., 155 metres (Thiele: *hottentota*).

Remarks. M. pruinosa is listed above on the authority of von Martens (1903). *M. pica* was described from an unknown habitat, but listed as South African by Smith (1903), and Turton, though the latter did not claim to have found any at Port Alfred. I have seen no specimens with a 'jagged white band' encircling the black whorls '*next the sutures*' (Reeve, italics mine). A white band is frequently present in the *middle* (or slightly above) of the whorl, and may be almost continuous, or divided into a series of spots, or it may appear as a white mark only on the outer lip.

Peile (1922) remarks that though *ebenus* (to which Sowerby likened his *merula*) has a smooth shell, its var. *savignyi* is costulate; *merula* is 'slightly costulate'. This lends support to the present contention that only one species is found in South Africa.

The references to von Martens and Thiele are included with queries. Thiele disagreed with von Martens's identification, but left the specimens *sub judice*; his figure strongly suggests that the dead and bleached *Valdivia* specimens were really *aerumnosa* (q.v. p. 41).

Turton's *simplex* var. *alfredensis* appears to be merely a redescription of Reeve's *patula*: 'cinerea, fusco hic illic variegata et nebulata' (Reeve), 'a light mottled variety showing various colours' (Turton).

Peile's specimens of *merula* (Durban) and *patula* (East London) were both supplied by Tomlin, who presumably favoured the recognition of two species. Their radulae scarcely differ sufficiently to indicate two species; especially as my examples are intermediate in shape.

I consider therefore that only one species, common around the whole South African coast from Durban to Port Nolloth, should be recognized; but I am not in a position to decide whether *pica*, having page precedence, should replace *patula*, or whether the earlier *pruinosa* should be accepted.

The *Pieter Faure* obtained no examples except one very slender shell off Cape Morgan, 47 fathoms (S. Afr. Mus. no. A8812. P.F. coll.). Pale brown. Four whorls, 8 × 3 mm. (a normal 4-whorled example is 7·5 × 3·3–3·5 mm.). 13 ribs on last whorl; 13–14 spiral striae on last whorl, those nearest the suture closer together than the others, as in normal examples.

Gen. Imbricaria Schumacher

Biconical. Radula as in typical *Mitra*.

Imbricaria carbonacea Hinds

1844. Hinds. *Zool. Voy. Sulphur.*, p. 41, pl. xi, figs. 9, 10.
1910. Dautzenberg. *Act. Soc. Linn. Bordeaux*, p. 47.
1912. id. *Ann. Inst. oceanogr.*, V, fasc. 3, p. 28.

Smooth, polished, with obscure grooves on base; columella pleats 5, the lower ones obscure. Size not stated: Hinds's figure 22 × 11 mm. Black, aperture internally pale.

Baie de Rufisque (Dakar, West Africa), 18–20 metres (Dautzenberg 1910); Mossamedes, 15–20 metres (Dautzenberg 1912).

Remarks. Described by Hinds from deep water on the Agulhas Bank, but it has not since been recorded from South African waters. Probably some error occurred in labelling Hinds's material, as Belcher (in command of the *Sulphur*) is known to have relied upon his memory.

Fam. *OLIVIDAE*

1929. Thiele. *Handbuch*, i, p. 330.

On account of its radula Thiele included *Melapium* in this family, although the shape of the shell is very different from that of any of the other genera.

Thiele (p. 332) created the genus *Zemiropsis* for *Eburna* (i.e. *Babylonia*) *papillaris* Sow., stating that the systematic position was doubtful in the absence of knowledge of the operculum and animal. He evidently overlooked Sowerby's figure (1902. *Mar. Invest. S. Afr.*, ii, pl. 2, fig. 3); and moreover gave no *conchological* reasons for instituting a new genus or for including it in the *Olividae*. In fact this species is a true *Babylonia* (p. 147).

Gen. Oliva Brug.

The *Pieter Faure* obtained one very worn *ispidula* Linn. from Morewood Cove (between Umhloti and Umvoti, Natal), 27 fathoms; one living *dactyliola* Duclos 1835 from off Tugela River, 14 fathoms; and one dead *dactyliola* from off Umkomaas, 13 fathoms (the first two identified by Sowerby 3rd).

Braga (1952. *Anais J. Invest. Ultramar.*, vii, 3, p. 71) records *inflata* Lam. 1811 (= *bulbosa* Bolten 1798) from Delagoa Bay; and *brasiliensis* Chemn. (!) from Mozambique. Macnae & Kalk (1958. *Nat. Hist. Inhaca Is.*, p. 128) add *elegans* Lam. and *scitula* Marrat from Delagoa Bay.

Gen. Sylvanocochlis Melvill

1889. (Melvill) in Sowerby, *J. Conch.*, vi, p. 149 (subgen. *Mariona*, non Vayssière 1879).
1903. Melvill. ibid., x, p. 325.

Shell ovate-fusiform, with thick walls. Columella concave, with parietal callus constricting the posterior end of aperture, separated from outer lip by a narrow slit, which is accentuated by the slight depression on last whorl forming an indent in the outer lip. Canal short, wide. Last whorl with a spiral groove near base forming a denticle on outer lip.

Operculum horny, large, oval, nucleus apical.

Radula with not very broad, tricuspid central plate, and bicuspid lateral plate (as in *Pseudoliva*).

A monotypic, indigenous genus, if maintained distinct from *Pseudoliva*.

Sylvanocochlis ancilla (Hanley)

Fig. 15(*a*)

1859. Hanley. *Proc. Zool. Soc. Lond.*, p. 429 (*Pseudoliva a.*).
1889. Sowerby. loc. cit., p. 149, pl. 3, fig. 2 (*Pseudoliva a.*).
1892. id. *Mar. Sh. S. Afr.*, p. 15, pl. 1, fig. 14 (*Pseudoliva a.*) (this figure, reproduced from the 1889 figure, does not show the characteristic posterior slit in the aperture).
1903 (1 July). Melvill. loc. cit., p. 324, fig.
1903 (8 July). Sowerby. *Mar. Invest. S. Afr.*, ii, p. 228 (*Pseudoliva a.*).
1904. Smith. *J. Malac.*, xi, p. 23 (*Sylvanocochlea*, err.).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 35 (*Sylvanocochlea*, err.).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 430.
1932. Turton. *Mar. Sh. Port Alfred*, p. 33 (? and pl. 7, no. 246).

Aperture $1\frac{1}{2}$–$1\frac{2}{3}$ times the spire. Protoconch $1\frac{1}{2}$ whorls, alt. 1·5, diam. 2 mm., smooth (but worn). Postnatal whorls 4. Periostracum thick, forming close axial wrinkles, the free margins of which are minutely fimbriate.

Operculum slightly convex, 23 × 12 mm. in 51 mm. shell.

Fulvous or slightly pinkish or violaceous, periostracum dull brown, operculum dark brown. Animal pale, sprinkled with black specks around margin of foot, siphon closely ringed with black.

Radula (of Algoa Bay specimen) with 57 rows, fig. 15(*a*).

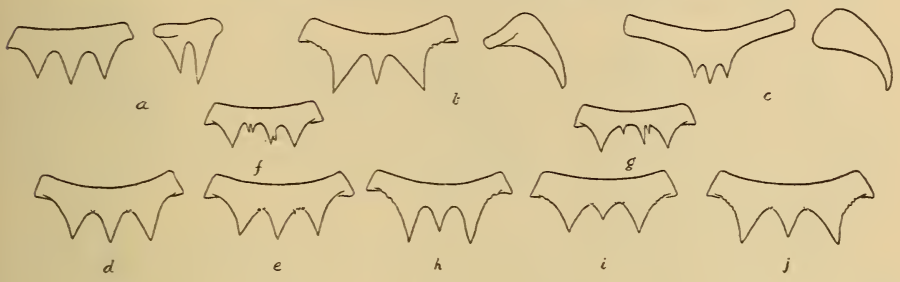


Fig. 15.

Central and lateral radula plates of (*a*) *Sylvanocochlis ancilla* (Hanley); (*b*) *Ancilla bullioides* Rve.; (*c*) *Melapium lineatum* (Lam.). Central plate of (*d*) *Ancilla fasciata* Rve.; (*e*) *A. fasciata-albozonata* Smith; (*f*), (*g*) *fasciata*, variation of cusps; (*h*) *A. obtusa* (Swainson); (*i*) *A. contusa* Rve.; (*j*) *A. errorum* Tomlin.

Kaffraria (Hanley), Port Elizabeth (Sowerby), Port Alfred (Bartsch, Turton); off Great Fish River, 40 fathoms, one dead (S. Afr. Mus. P.F. coll.). Living: 33° 45′ S. 26° 44′ E. (off the Kowie), 40 fathoms (Sowerby 1903, typ. err. 34° 45′ S. 25° 44′ E.); Algoa Bay, 39 metres, living (U.C.T.). Off Cape St. Francis, 45 fathoms (Tomlin, *fide* Burnup).

The shell of the living specimen recorded by Sowerby from off the Kowie is in S. Afr. Mus.; no report was published on the animal.

Gen. Ancilla Lam.

1799. Lamarck. *Mem. Soc. H. N. Paris*, i, p. 70.
1903. Von Martens. *D. Tiefsee Exp.*, vii, pp. 37, 38.
1925. Thiele. ibid., xvii, p. 189 (S. Afr. *Ancilla* species, comments on von Martens 1903).

Shell ovate-fusiform, spire low or high, often covered with callus; body whorl with basal spiral groove, which may form a denticle on outer lip. Parietal callus often extending down the columella; canal short and broad. Operculum oval, nucleus apical (or subapical); sometimes reduced in size or even absent.

Radula with tricuspid central plate, unicuspid lateral plate.

Remarks. *A. osculata* Sow. is transferred to the genus *Bullia*.

Although the basal groove is faintly traceable even in very worn specimens of *Ancilla*, and would scarcely have been overlooked by Smith, one cannot help

wishing for a re-examination of *Bullia ancillaeformis* Smith (1906. *Ann. Natal Mus.*, i, p. 37, pl. 7, fig. 8); the shell is so very like *A. bullioides* in shape. But the locality (Natal) is against it being *bullioides*.

Ancilla obesa Sow.

Fig. 16(*f*)

1859. Sowerby. *Thes. Conch.*, iii, p. 65, pl. 213, figs. 44, 45.
1932. Turton. *Mar. Sh. Port Alfred*, p. 32.

Not *obesa* von Martens 1903 = *callifera* Thiele 1925 = *reevei* Smith.

Spire without any covering of callus, parietal callus thin, profile of sides straight or very slightly concave, apex pointed. Aperture about twice as long as spire. Postnatal whorls 4. Basal groove meeting columella slightly above middle. 18 × 9·5 mm. Turton: 21 mm. long.

Operculum and radula?

Fawn, a spiral band of alternating orange-brown and white spots on upper part of whorls, below this on body whorl an irregular series of spots, and another series below the basal groove; between these, two series orange-brown axial zigzags forming a reticulate pattern, lower part of base brown; reflected columella white.

Port Elizabeth, Kowie and Port Alfred (Sowerby, Bartsch, Turton, S. Afr. Mus.). Tongaat (north of Durban), East London, and Still Bay (S. Afr. Mus.).

The record of 6 specimens in S. Afr. Mus., registered as having come from Hout Bay on west coast of the Cape Peninsula, is not acceptable.

No living specimens seen.

Ancilla reevei Smith

Fig. 16(*e*)

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 37 (*Ancillaria obesa*, non Sow.).
1904. Smith. *J. Malac.*, xi, p. 29, pl. 2, fig. 11.
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 190, pl. 33 (21), fig. 15, and text-fig. 7 (radula) (*callifera*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 31, and var. *bipartita*, p. 31, pl. 6, no. 233.

Spire covered with thick callus, especially above aperture, right profile convex, left profile convex above, indented below (in the suture), apex pointed. Aperture about twice as long as spire. Postnatal whorls 4 (Smith: ? 5). Basal groove meeting columella about in middle. 22 × 10–11 mm. Turton: 24 mm. long.

Operculum?

Fawn, spire mostly brown, a brown band between the sutural indent and lower margin of callus with white spots on its lower border, a series of brown spots above the basal groove, extending upwards as zigzag or undulate brown

axial lines, often joining to form a reticulate pattern; lower part of base with 2 brown bands and a white one between them; parietal callus and reflected portion of columella white.

Radula (Thiele), central plate with small middle cusp flanked on either side by a large cusp, and externally 4–5 denticles.

Port Alfred and the Kowie (Smith, Bartsch, Turton, S. Afr. Mus.). 34° 51′ S. 19° 37′ E., 80 metres (von Martens, Thiele).

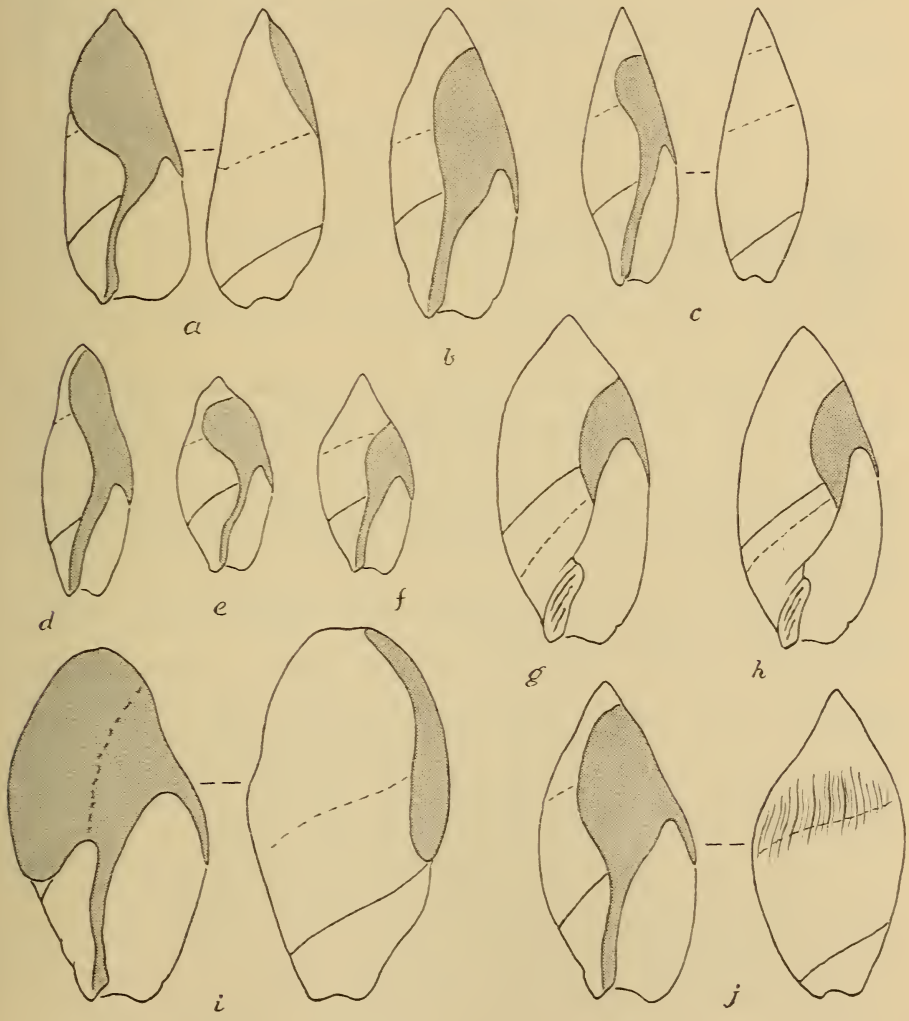


Fig. 16.

Ancilla, to show callus (stippled) and basal groove (*a*) *bullioides* Rve.; (*b*) *contusa* Rve.; (*c*) *hasta* von Martens; (*d*) *errorum* Tomlin; (*e*) *reevei* Smith; (*f*) *obesa* Sow.; (*g*) *marmorata* Rve.; (*h*) *fasciata* Rve.; (*i*) *obtusa* (Swainson); (*j*) *optima* Sow. In the front view of *obtusa* the callus is brown on the left, white on the right of the dotted line.

Remarks. Thiele was correct in not accepting von Martens's identification of the *Valdivia* shell as *obesa* Sow., but he overlooked Smith's species and proposed a new name.

The indent on the left side of the spire is characteristic, and together with the spire-callus distinguishes this species from *obesa*; the two species are very similarly coloured and pattern alone is not always decisive in separating them.

The spire-callus is not an adult character, but occurs on younger examples smaller than the largest ones of *obesa*; can it possibly be a sexual character?

Turton's *bipartita* lacks the indent on left profile of spire, but the specimen appears to be water-worn.

Ancilla obtusa (Swainson)

Figs. 15(*h*), 16(*i*)

1825. Swainson. *Q. J. Sci.*, xviii, p. 282 (*Ancillaria o.*).
1848. Adams & Reeve. *Voy. Samarang. Moll.*, p. 31, pl. 13, fig. 6.
1859. Sowerby. *Thes. Conch.*, iii, p. 62, pl. 211, figs. 15, 16.
1886. Watson. *Challenger Rep.*, xv, p. 229.
1913. Bullen Newton. *Rec. Albany Mus.*, ii, p. 348, pl. 24, figs. 3, 4 (*Baryspira* sp.).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 31.

Spire completely enveloped in callus. Shell ovate with shortly pointed apex, or obovate with bluntly rounded apex. Aperture about 1½ times spire. Postnatal whorls ? (concealed in callus). Basal groove meeting columella at posterior third. Callus spreading laterally to left at top of aperture in a broad rounded lobe which is continued on to spire, and which is visible when shell is viewed from back (more so in adult than in juv.). 47 × 28 mm. Turton: 54 mm. long.

Operculum oval, slightly concave, nucleus subapical, 15 × 8 mm. in 39 mm. shell with aperture 29 mm.

Fawn or buff, a warm brown band on the base; the same colour shows through the callus on spire; callus on body whorl brown, parietal callus above aperture white; often arcuate or flame-like streaks on the brown body-whorl band; middle band margined above and below with white and usually showing the growth-lines. Operculum yellowish-horny or amber. Animal (Mossel Bay, U.C.T.) dirty white with rather coarse sepia-brown speckling.

Radula with 95–100 rows: middle cusp of central plate rather broad, smaller than the other two, outer margins of the latter crenulate.

Fossil, Mio-Pliocene: Redhouse, near Port Elizabeth (Newton); Quaternary: Sedgefield near Knysna (A. R. H. Martin).*

Port Elizabeth and Algoa Bay, Port Alfred (Sowerby, Bartsch, Turton, S. Afr. Mus.). Tongaat (north of Durban), Still Bay, Hermanus (S. Afr. Mus.). Simon's Bay, False Bay, 15–20 fathoms (presumably living) (Watson). Mossel Bay (living) (U.C.T.).

* For description of these deposits see: Martin. *S. Afr. J. Sci.*, 52, p. 187, 1956.

Off Cape Natal (Durban), 62 fathoms, off Glendower Beacon (Port Alfred area) and Great Fish Point, 66–100 fathoms, Mossel Bay and off Cape St. Blaize, 17–19 fathoms, all dead (S. Afr. Mus. P.F. coll.).

Algoa Bay, and off East London, 10–20 fathoms, living (S. Afr. Mus. P.F. coll.).

Remarks. Two young specimens 14 × 7 and 17 × 10 mm. are ovate in shape with pointed apex, with slightly convex profiles subtending an angle a little less than 90°. Larger specimens (21 mm. upwards) may retain the pointed apex (largest 42 mm.), or show various stages in its envelopment in callus, the final stage being a blunt and broadly rounded apex.

Four juveniles 2·5–4 mm., and one 6 mm. long (Still Bay, Muir coll.) may be this species, but no connecting links between the 6 and 14 mm. specimens are available. The smallest is 2·5 × 1·3 mm. 1½ whorls. The 6 mm. specimen, though slightly worn, shows the characteristic shape of the callus. Juveniles 7 mm. and upwards of *fasciata-albozonata* (a species common at Still Bay) have a narrower apex, and the callus does not expand laterally in a rounded lobe.

Ancilla optima Sow.

Fig. 16(*j*)

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 16 (*australis*, non Sow.).
1897. id., *Append. Mar. Sh. S. Afr.*, p. 7, pl. 6, fig. 31.

Shell ovate, spire not completely enveloped in callus, apex pointed, both profiles nearly straight. Aperture 1½–1⅔ times spire. Postnatal whorls ? Body whorl gently shouldered, on upper portion with growth-lines forming low arcuate, obliquely protractive lirae. Basal groove meeting columella at about posterior quarter. Parietal callus expanding laterally, but not in a broad rounded lobe, and not visible when viewed from back, scarcely reaching apex. 53 × 27 mm.

Operculum oval, slightly concave, nucleus subapical, 17 × 9 mm. in 37 mm. shell with aperture 21 mm.

Fawn or buff; upper part of body whorl, spire, and base chestnut-brown, the upper brown band sharply defined from the pale middle band (which includes the basal groove) but becoming paler towards the (concealed) suture, the arcuate lirae paler than the ground colour.

Radula with about 75 rows (juv.); middle cusp of central plate narrow, shorter than the other two, outer margin of the latter denticulate, a minute denticle on either side at base of middle cusp (cf. fig. 15(*b*), *bullioides*).

Durban (Sowerby); Pondoland coast (S. Afr. Mus.); off Durban, 40 fathoms, from fish stomachs (S. Afr. Mus. Ross-Frames coll.).

Living: off Cape Vidal and O'Neil Peak (Zululand), off Cape Natal (Durban), and off Cape Morgan, 40–80 fathoms (S. Afr. Mus. P.F. coll.). Delagoa Bay (U.W.).

Remarks. The arcuate lirate growth-lines are distinctive.

The Delagoa Bay specimen is very dark, especially the base and the callus. The lirate growth-lines are covered by a film of callus and indistinct.

Three specimens from Tongaat (30 miles north of Durban) are also rather dark, the middle band darker than in typical *optima*.

Ancilla contusa Rve.

Figs. 15(*i*), 16(*b*)

1864. Reeve. *Conch. Icon.*, pl. 9, fig. 31.
1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 7, pl. 6, fig. 23 (*decipiens*).
1903. id. *Mar. Invest. S. Afr.*, ii, p. 228, pl. 3, fig. 3.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 34 (*decipiens*).

Shell ovate, apex pointed, spire completely (or nearly so) enveloped in callus, profiles nearly straight or slightly convex, subtending an angle of *c.* 55°–60°. Aperture a little longer than (up to 1¼ times) spire. Postnatal whorls ? Basal groove meeting columella nearly at top of aperture. Callus expanding slightly at suture of body whorl (cf. *optima*) and continued on to spire. 52 × 25 mm.

Operculum oval, slightly concave, nucleus subapical, 11 × 5·5 mm. in 25 mm. shell with aperture 14 mm.

Cream or pale buff, spire usually white, but a faint brown sutural band sometimes shows through the callus; upper brown band usually well marked, especially its lower edge (where callus ends); a chestnut-brown band on base; on middle of body whorl a series of spiral brown bands or lines, varying in number and intensity, sometimes very indistinct.

Radula with *c.* 95 rows, middle cusp of central plate rather broad but smaller than the other two, outer margin of latter crenulate or denticulate, one or two minute denticles on either side of base of middle cusp.

Durban and Natal, 25–30 fathoms (Sowerby); Port Elizabeth (Sowerby: *decipiens*); Port Alfred (Bartsch: *decipiens*); Pondoland coast (S. Afr. Mus.). Natal, 25–27 fathoms, and from fish stomachs off Durban (S. Afr. Mus. P.F. coll.). Durnford Point (Zululand) 13 fathoms, living (S. Afr. Mus. P.F. coll.).

Remarks. *A. decipiens* is the beach-worn form of *contusa* tinged with pink or violaceous, as are several other South African beach-weathered shells.

Some specimens, especially when the spiral brown bands are indistinct or bleached out, may be difficult to separate from *optima*, but the arcuate lirae of the latter are usually distinctive.

Ancilla bullioides Rve.

Figs. 15(*b*), 16(*a*)

1864. Reeve. *Conch. Icon.*, sp. 37.
1886. Watson. *Challenger Rep.*, xv, p. 229 (*montrouzieri*, non Souv.).

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 228 (*bulloides* [*sic*]).
? 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 38 (*dimidiata*, non Sow. part: Sta. 113).
? 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 35 (*bulloides* [*sic*]).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 191, pl. 33 (21), fig. 19 (cf. *montrouzieri*).
? 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 32 (*bulloides* [*sic*]).

Bullia-like, the greatest width anterior to (below) middle of length. Ovate, spire high. Aperture a little longer than spire, expanded in lower half. Postnatal whorls ? Basal groove meeting columella nearly at top of aperture. Callus expanding laterally over the suture, extending to and covering the apex (the actual point of the apex is only thinly covered), partly visible in back view. 40 × 17 mm.; smallest example seen 14·5 mm. long.

Operculum slightly concave, oval, narrowing above, inner margin sinuous, nucleus subapical, 17 × 7 mm. in 40 mm. shell with aperture 20 mm.

Creamy-white, spire pale pinkish-orange or buff, a spiral band of the same colour on base. Operculum yellowish-horny or amber.

Radula with *c.* 75 (juv.) to 95 (adult) rows; middle cusp of central plate narrow, smaller than the other two, sometimes markedly so, outer margin of latter crenulate or feebly denticulate.

Off Cape of Good Hope, 98 fathoms (Watson); off Cape Peninsula, 190 fathoms (Sowerby). Living: south of False Bay, around Cape Point, off west coast of Cape Peninsula, and northwards to the Saldanha Bay area, 85–195 fathoms (S. Afr. Mus. P.F. coll.).

35° 11′ S. 23° 2′ E., 500 metres, dead shells inhabited by Hermit crabs (Thiele: Sta. 103, fig. 19).

The identification of specimens from Port Alfred (Bartsch, Turton) is very doubtful.

Remarks. Watson had one specimen and was unable to find any outstanding differences between it and the New Caledonian *montrouzieri*. Thiele also compared some specimens with the latter species. Nevertheless the two species are not likely to be synonymous. It is even more unlikely that this deep-water Cape species should be 'common' (Turton) on the beach at Port Alfred!

I have seen no authentic *dimidiata*. Von Martens recorded this species from three localities. I am inclined to think that his specimens from Sta. 113, south of False Bay, 318 metres, were really *bullioides*; those from shallow water 70 metres in Simon's Bay (False Bay) Sta. 114 were *errorum*; the third lot from Sta. 104 are from a locality farther east, not far from where *hasta* has been obtained.

Thiele suggested identifying all these with *bullioides*; but his fig. 18 is certainly not *bullioides*.

On the other hand, the specimens covered with *Epizoanthus* and inhabited by the Hermit crab *Parapagurus pilosimanus*, which Thiele compared with *montrouzieri*, are undoubtedly *bullioides*, although his fig. 19 has not quite the characteristic shape.

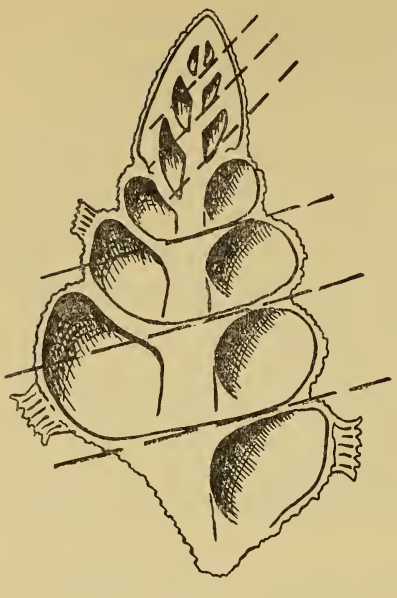


Fig. 17.

Section of *Ancilla* shell and the Coelenterate *Epizoanthus* inhabited by Hermit-crab (*Parapagurus pilosimanus*), showing alteration in angle of spiral when the crab has outgrown the Ancilla shell.

In the *Pieter Faure* collection there are numbers of such specimens. The Hermit crab has a wider distribution around the southern slope of the Agulhas Bank, and as far east as off East London (Barnard. *Ann. S. Afr. Mus.*, xxxviii, p. 451, 1950), but utilizes any dead shell. Its distribution is therefore no criterion for the distribution of the mollusc; in fact the only specimens of the crab inhabiting Ancilla shells come from the Cape Point area where living *bullioides* have been obtained. Thiele's record was 35° 11′ S. 23° 2′ E., 500 metres.

The *Epizoanthus* colony on a dead shell inhabited by *Parapagurus* continues to grow in a helicoid spiral, the pitch increasing *pari passu* with the girth of the crab. When a crab has occupied and outgrown an Ancilla shell the helicoid addition does not continue at the sharply acute angle of the Ancilla shell, but at a wider angle, so that in external view the crab appears to be occupying a Buccinoid shell (fig. 17).

Ancilla errorum Tomlin

Figs. 15(*j*), 16(*d*)

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 229 (*angustata*, non Sow.).
? 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 38 (*dimidiata*, non Sow., part: Sta. 114).
1906. Smith. *Ann. Natal Mus.*, i, p. 28 (*Marginella angustata*).
1921. Tomlin. *J. Conch.*, xvi, p. 216, pl. 8, fig. 2.

Shell ovate, greatest width at middle length. Spire moderately high, enveloped in callus. Aperture a little longer than spire. Postnatal whorls ? Basal groove meeting columella at upper quarter of aperture. Callus expanding laterally and continued almost to apex, not visible in back view. 15 × 7 mm.

Operculum oval, slightly concave, nucleus subapical, 6·5 × 2 mm. in shell 14 mm. with aperture 8 mm.

Pale buff or fawn, a brown sutural band, and another band on base. Operculum yellowish-amber.

Radula with *c.* 80 rows, middle cusp of central plate smaller than the side cusps, outer margin of latter denticulate, a minute denticle on either side at base of middle cusp.

Off Cape Point, 42 fathoms (Sowerby, Tomlin).

False Bay, Walker Bay, Algoa Bay, and off Umhloti River (Natal), 20–47 fathoms (S. Afr. Mus. P.F. coll.). 35° S. 20° 49′ E., 91 metres (s.s. *Africana*, per U.C.T.).

Remarks. Smith stated that Sowerby inadvertently recorded this species as an *Ancilla* instead of a *Marginella*. The statement, however, is incorrect and should be ignored, because the specimens recorded by Sowerby and returned by him are in fact *Ancilla*. The same specimens were later seen by Tomlin, who also saw the Natal specimen recorded above.

On account of the locality I am inclined to think the *Valdivia* specimens from Sta. 114, Simon's Bay (False Bay), 70 metres, identified by von Martens as *dimidiata*, should be referred here. Thiele without any mention of Tomlin's species, referred them to *bullioides*.

The species is a small edition of *bullioides* living in shallower water. A juvenile *bullioides*, 14·5 mm. long, however, is easily distinguished by the shape of its shell and of the callus.

Ancilla hasta von Martens

Fig. 16(*c*)

1902. Von Martens. *SB. Ges. naturf. Fr. Berlin*, p. 241.
1903. id. *D. Tiefsee Exp.*, vii, p. 37, pl. 3, fig. 13.
? 1903. id. ibid., p. 38 (*dimidiata*, non Sow., part: Sta. 104).
? 1925. Thiele. ibid., xvii, p. 191, pl. 33 (21), fig. 18 (*bulloides*, non Rve.).

Shell fusiform, greatest width at middle length, spire high, apex pointed. Aperture about 1½ times spire. Postnatal whorls 7 (von Martens). Basal groove meeting columella at upper third of aperture. Callus expanding on body whorl suture, extending to but not covering the preceding suture, not visible in back view. 25 × 10 mm. Three other specimens 16–19 mm. long. 30 × 11 mm. (von Martens).

'Pale rosy-fulvous, white towards apex' (von Martens). Creamy-white, callus and sutures slightly darker buff.

35° 10′ S. 23° 2′ E., 500 metres (von Martens).

65–73 miles off Cape St. Blaize, 85–90, and 125 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Von Martens does not mention the shape and extent of the callus. The *Pieter Faure* localities are near to that of the *Valdivia*, and the four dead specimens taken by the former vessel are undoubtedly referable to *hasta*.

The *Valdivia* specimens from Sta. 104. 35° 16′ S. 22° 26′ E., 155 metres, recorded by von Martens as *dimidiata*, may possibly be *hasta*. Thiele's figure 18 is much more like a *hasta* than a *bullioides*.

Ancilla fasciata Rve.

Figs. 15 (*d–g*), 16(*h*)

1864. Reeve. *Conch. Icon.*, sp. 44.
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 16 (*cinnamomea*, non Lam.).

1904. Smith. *J. Malac.*, xi, p. 29, pl. 2, fig. 9 (*albozonata*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, pp. 190, 191, pl. 33 (21), fig. 17 (*agulhasensis*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 32, pl. 6, no. 238 (pattern var.) and p. 32 (*albozonata*).

Aperture about twice the spire. Basal groove meeting columella near upper end of aperture. Callus beginning about midway on columella, not much expanded laterally, continued upwards nearly to suture with preceding whorl. The lower of the two incised lines on base (the upper being the basal groove) nearer to the latter than to the reflected columella (contrast *marmorata*). 26 × 12 mm.

Operculum present but reduced in size, ovoid-oblong, slightly concave, growth-lines distinct, with very fine striae radiating from nucleus, 3 × 2 mm. in 17 mm. shell with 11 mm. aperture.

Brown, apex white, a white band below the brown suture on body whorl, another white band above reflected columella on base. The variety figured by Turton chequered with oblong brown spots.

Animal pale biscuit colour.

Radula with 80–90 rows, cusps on the central plate variable: all three may be subequal in size, with 1–4 denticles on either side of the middle cusp; sometimes there are (3) 4–5 cusps between the large side cusps, varying in size and arrangement, sometimes two of them united to form a bifid cusp. Thiele found the central plate had 5 smaller, somewhat irregular cusps between the two big ones.

Port Elizabeth and Port Alfred (auct. et S. Afr. Mus.).

St. Francis Bay, 80–100 metres, Algoa Bay. 35° 16′ S. 22° 26′ E., 155 metres, and (living) Simon's Bay (False Bay), 70 metres (von Martens, Thiele).

Off Tugela River (Natal), 37 fathoms, 1 alive; off Umhloti River (Natal), 100 fathoms, 1 dead; off Cape Natal (Durban), 85 fathoms, 1 alive; Algoa Bay to off Walker Point, 37–66 fathoms, living (S. Afr. Mus. P.F. coll.). False Bay, living (U.C.T.).

Remarks. As typical of this species and of *marmorata* I have had for comparison examples identified by Tomlin.

Thiele was unable to find any trace of an operculum in his specimens. His description of the radula bears out the variability of the cusps which I have found in several examples.

Ancilla marmorata Rve.

Fig. 16(*g*)

1864. Reeve. *Conch. Icon.*, sp. 32.
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 17, pl. 1, fig. 15 (*pura*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 38.
1906. Smith. *Ann. Natal Mus.*, i, p. 27, pl. 7, fig. 4 (*ordinaria*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 190, pl. 33 (21), fig. 16 (referred with ? to *agulhasensis*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 32, and var. *major*.

Distinguished from *fasciata* by the two incised lines on base being farther apart, the lower one being midway between the upper line (which is the basal groove) and the reflected columella; clearly shown in Smith's and Thiele's figures. 19 × 9 mm. (S. Afr. Mus.), 21 × 9 mm. (Sowerby); 20 mm. long (Turton: var. *major*).

Operculum present but reduced in size, ovoid, with distinct growth-lines and very fine radiating striae, 2·5 × 1·5 mm. in 10 mm. shell with 6·5 mm. aperture.

Fawn or pale buff, sometimes with faint mottling or axial lines, a darker sutural band on body whorl, and another between the two incised lines; or pure white.

Radula with about 70 rows, cusps on central plate subequal in size, no denticle on either side of middle cusp (only one specimen examined).

Port Elizabeth (Sowerby: *pura*); Port Alfred (Turton, S. Afr. Mus.); Port Shepstone (Natal) (Smith: *ordinaria*).

35° 16′ S. 22° 26′ E., 155 metres (von Martens, Thiele).

Off Umhloti River (Natal) 40 fathoms, dead; off Cape Natal, 54 fathoms, living; off Umkomaas (Natal), 40 fathoms, living; off Cove Rock (East London area), 22 fathoms, dead but fresh; off Glendower Beacon (Port Alfred area), 66 fathoms, 1 alive; False Bay, 32 fathoms, 1 alive (S. Afr. Mus. P.F. coll.).

False Bay, 1 alive (U.C.T.).

Remarks. A. pura appears to be a somewhat slender example of this species, but Sowerby's figure is inadequate.

One living specimen was taken by the *Pieter Faure* off the west coast of the Cape Peninsula in 60 fathoms; it is white, and seems indistinguishable from *marmorata*. I should have assumed an error in labelling, unless confirmation had been provided by finding living examples in an intermediate locality, viz. False Bay (P.F., and U.C.T.). Its radula has 60 rows, the 3 main cusps on central plate subequal, on one side of the median cusp one small cusp, on the other side 2 small cusps.

The P.F. specimen from False Bay is fawn coloured, but the U.C.T. example is white.

Gen. Melapium H. & A. Adams

1853. H. & A. Adams. *Gen. Moll.*, i, p. 136.
1889. Smith. *Ann. Mag. Nat. Hist.* (6), iii, p. 267.
1929. Thiele. *Handbuch*, i, p. 332.
1937. Peile. *Proc. Mal. Soc.*, xxii, p. 182 (radula).

Shell broad, rounded-piriform, body whorl bulbous, outer lip expanded in adult. Spire low, protoconch papilliform. Columella curved, with a ridge from middle bordering the canal; strong parietal callus within aperture posteriorly. Periostracum thin. No operculum.

Radula with broad central plate, tricuspid, lateral plate unicuspid (as in *Oliva*).

Melapium elatum (S. & W.)

1829. Schubert & Wagner. *Conch. Cab.*, xii, pp. 92, 94, pl. 226, figs 4012, 4013 (*Pyrula e.*).
1901. Smith. *J. Conch.*, x, p. 110.
1952. Bayer. *Zool. Med.*, xxxi, no. 25, p. 297 (as syn. of *lineatum*).

Large. Whorls 4, last whorl with a blunt but definite shoulder. 63 × 61 mm. (protoconch worn).

White with numerous narrow axial brown or orange lines, slightly undulate and sometimes broken into discontinuous streaks.

Off Durban, 40 fathoms (from fish stomachs) (Smith, 1901).

Distribution. East Indian seas.

Remarks. Smith's record is the only one with precise locality. S. Afr. Mus. has 4 large specimens and one half-grown from the Ross-Frames collection, without locality; but they look as if they might have been taken from fish stomachs, from which source Ross-Frames is known to have obtained some of his shells.

Bayer includes this species as a synonym of *lineatum.* Probably only one species should be recognized. The smallest of the 5 specimens ex coll. Ross-Frames measures 40 × 38 mm. and has a definite shoulder on the last whorl.

Melapium lineatum (Lam.)

Fig. 15(*c*)

1822. Lamarck. *Anim. sans. Vert.*, vii, p. 147, no. 27 (*Pyrula l.*).
1856. Wood. *Index Test.*, ed. Hanley, p. 212, pl. 4, fig. 8 (*Buccinum bulbus*).
1889. Smith. *Ann. Mag. Nat. Hist.*, iii, p. 269 (with radula).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 26.
1903. Thiele. ibid., p. 166, pl. 9 (4), fig. 51 (radula).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 62 (*bulbosum* err.).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 191.
1932. Turton. *Mar. Sh. Port Alfred*, p. 79 (*bulbosum* err.).
1937. Peile. loc. cit., p. 182, fig. 16 (radula).
1951. Barnard. *Beginner's Guide S. Afr. Sh.*, p. 69, pl. 6, fig. 15 and fig. 37 (egg-capsules).
1952. Bayer. *Zool. Med.*, xxxi, p. 297 (references).

Protoconch, all specimens worn. Postnatal whorls 4. Last whorl without any trace of a shoulder; 3rd and beginning of 4th whorl with 4–5 feeble spiral striae on upper part. 30 × 28 mm.; smallest example seen 9 × 6 mm.

White with numerous axial brown or orange lines, sometimes undulate or arcuate or discontinuous, sometimes in addition an irregular series of oblong (axially) spots around the periphery; anterior canal externally suffused with crimson.

Animal (as preserved) foot dull buff with 2 submarginal red lines; Prof. Day says the margin is blue when alive.

Radula with 60–65 rows.

Natal (Krauss); Port Alfred, Port Elizabeth and Algoa Bay, St. Francis Bay (auct.); Port St. Johns and Still Bay (S. Afr. Mus.); O'Neill Peak (Zulu-

land), 90 fathoms; off Tongaat, 36 fathoms (S. Afr. Mus. P.F. coll.). Living: East London to Mossel Bay, 19–50 fathoms (S. Afr. Mus. P.F. coll.), also Mossel Bay (U.C.T.); 33° S. 28° 11′ E., 31 fathoms (U.C.T.).

Remarks. Some of the Still Bay beach specimens (Muir coll.) are quite fresh, with unfaded brown streaks and spots; quite possibly the species lives as far west as this locality.

Egg-capsules. Six specimens (P.F. coll. Nov.-Dec. 1898, off Cape Recife) each with 2 capsules attached on outer side of the parietal wall and curving inwards towards the aperture. 10–11 × 5–6 mm., subcylindrical, cross-section somewhat triquetral; the two inner surfaces horny, but the outer surface feebly calcified. One contained a single crushed embryo; all the others were longitudinally split and empty. This embryo could not be definitely determined as a *Melapium*, consequently these capsules can only be presumed to belong to this mollusc. It seems unlikely, however, that another species would deposit its egg-capsules in this position, and moreover they have not been found attached to any other Gastropod.

One of the U.C.T. East London specimens also carried two egg-capsules (empty): 21 May 1958.

Fam. *FASCIOLARIIDAE*

Gen. Fasciolaria Lam.

1911. Strebel. *JB. Hamb. Wiss. Anst.*, xxviii, pp. 1–58, 15 pls.

Shell usually large, fusiform, not umbilicate; canal rather long. Parietal callus present or absent; columella with 3 pleats, sometimes with additional wart-like nodules; columella glaze adnate throughout to the rostrum. Protoconch large.

Operculum ovate, apex incurved, nucleus apical; internal surface with thickened shiny margin, especially at apex.

Radula long, with 3 plates in each row, central plate quadrangular, tricuspid (sometimes a smaller one on either side externally), lateral plate wide, with numerous subequal cusps; the number of the latter increases with growth and is not always a specific character.

Egg-capsule stalked.

Remarks. As in many other genera plump and slender individuals of the same species occur. Strebel (pp. 1, 42) mentioned the possibility of this being a sexual difference, and deplored the lack of evidence. Although only 5 individuals of one species of this genus have been available to me for sexing, they gave no support to the suggestion. (cf. *Burnupena delalandii*, p. 166).

Key to the South African species

1. No parietal callus . . . . . *filamentosa*
2. Parietal callus present.

a. Profile convex, without angular shoulder.
  i. Spiral sculpture fine and regular . . . . . *rutila*
  ii. Spiral sculpture irregular, coarser and finer lirae more or less alternating . . . . . *lugubris*

b. Profile angular, with shoulder knobs.
  i. Protoconch small, diam. 1·5 mm. Shell usually with dark spiral lines, usually in pairs, sometimes unicolorous . . . . . *trapezium*
  ii. Protoconch large, diam. (2·5 mm. worn) 3·5–5 mm. Shell unicolorous . . . . . *heynemanni*

Fasciolaria filamentosa Lam.

1880. Von Martens. *Mauritius & Seychellen*, p. 245.
1911. Strebel. loc. cit., p. 34, pl. 6, figs. 33, 34; pl. 7, figs. 35–37; pl. 15, fig. 63.
1929. Thiele. *Handbuch*, i, fig. 377 (radula).
1952. Satyamurti. *Bull. Madras Govt. Mus.*, n.s. I, 2, pt. 6, p. 185, pl. 17, figs. 9 *a–c*.
1952. Braga. *Anais Est. Zool. Invest. Ultramar.*, vii, 3, p. 73, pl. 2, fig. 2.

No parietal callus. Aperture longer than spire. Profile convex, sometimes with slight shoulder. Protoconch 1½ whorls, small (see Strebel, pl. 7, fig. 37), smooth. Postnatal whorls 7; 1st with 7 axial ribs, increasing to 11 on middle whorls, on later whorls forming only slight swellings on the shoulder; crossed by 4 spiral lirae on 1st whorl, increasing in number on middle and later whorls, more or less regular above shoulder, but alternately broad and narrow below, the larger ones becoming better marked on the base. Columella pleats distinct, glaze narrow; outer lip internally plicate. 172 × 71 mm. (Strebel).

Radula, lateral plate with 13 cusps (Thiele, fig. 377).

Natal (Sowerby), Mozambique (Braga).

Distribution. Red Sea, Zanzibar, Réunion, Mauritius, Seychelles, Madagascar and Indo-Pacific to Japan.

Remarks. A variable species (Strebel), but distinguished by the absence of the parietal callus.

Turton's record from Port Alfred (1932. *Mar. Sh. Pt. Alfred*, p. 49) is probably not *filamentosa*. Sowerby's Natal record was probably a dead shell.

Fasciolaria rutila Watson

Figs. 18(*a*), 19(*c*)

1882. Watson. *J. Linn. Soc. Lond.*, xvi, p. 335.
1886. id. *Challenger Rep.*, xv, p. 242, pl. 13, fig. 6.
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227, pl. 3, fig. 2 (juv. shell and radula).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 30.
? 1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, p. 6 (= *Med. Göteb. Mus.*, xxiii).
? Tomlin. *Ann. Natal Mus.*, v, p. 290.

Thin-walled, profile of whorls convex, without any shoulder. Protoconch (uncorroded) large, subglobular, 1 or 1½ whorls, diam. 5·5–7 mm., alt. 5–6 mm. (corroded: diam. 3·5, alt. 3 mm.). Postnatal whorls 5, smooth in appearance, but with numerous fine spiral lirae closely set, *c.* 11–12 on 1st whorl, becoming

a little stronger and more widely spaced on later whorls. Parietal callus present; columella with 3 pleats, but posterior one feeble and obscure in large specimens. Canal long, narrow, sigmoid; outer lip thin, not plicate internally. Periostracum thin. 132 × 51 mm.

Operculum 35 × 19 mm. in 132 mm. shell.

White with pale yellowish brown periostracum, operculum dark brown.

Radula with 230–250 rows, usually an accessory denticle externally on both sides on the central plate; lateral plate with 8 cusps in juv. (figured by Sowerby), in adult 13 on one side and 14 on the other (2 specimens), or 15 and 16 resp. (one specimen) (excluding the tiny internal denticle).

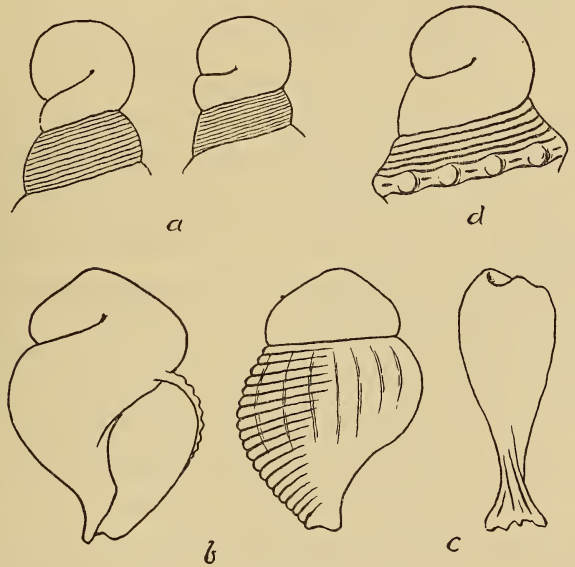


Fig. 18.

(*a*) *Fasciolaria rutila* Watson, protoconchs of two shells. (*b*) *F. lugubris* Rve., two views of protoconch extracted from (*c*) egg-capsule. (*d*) *F. heynemanni* Dnkr., protoconch.

Living: 35° 4′ S. 18° 37′ E., 150 fathoms (Watson); 33° 41′ S. 18° E., 178 metres (von Martens); off Cape Peninsula, 154 fathoms (Sowerby: juv.); off Cape Point, 85–145 fathoms (S. Afr. Mus. P.F. coll.); 33° 11′ S. 17° 57′ E., 77 metres; 31° 39′ S. 16° 55′ E., 287 metres (s.s. *Africana*); ? off Umhloti River (Natal), 40 fathoms (Sowerby).

Dead? St. Sebastian Bay, 40 fathoms (Odhner); off Cape St. Francis (Tomlin, coll. Burnup).

Remarks. The Burnup shell recorded by Tomlin was 5¼ in. (133 mm.) long.

The *Pieter Faure* obtained only one shell off the Natal coast (if the label was correct); all the others were from off the Cape Point. The *Africana* has shown that the distribution extends to 31° S. on the west coast. The large Natal

specimen, now in the British Museum, should be re-examined on account of its alleged locality.

More probable misidentifications are Odhner's 150 mm. and Burnup's 133 mm. shells. I consider that both of these are more likely to be the off-shore form of *lugubris*, which has stronger and more irregular spiral liration than *rutila*; the latter also has a more sigmoid canal.

Fasciolaria lugubris Rve.

Figs. 18(*b*, *c*), 19(*a*, *b*)

1847. Reeve. *Conch. Icon.*, sp. 2.
1848. Krauss. *Südafr. Moll.*, p. 110, pl. 6, fig. 12 (*badia*).
1911. Strebel. loc. cit., p. 31, pl. 6, figs. 30, 30*a*, 31.
1932. Tomlin. *Ann. S. Afr. Mus.*, xxx, p. 157, fig. 1 (*agulhasensis*).
1932. Haughton. *Tr. Geol. Soc. S. Afr.* (1931), pp. 34, 49.

Aperture longer than spire. Profile of whorls evenly convex, but sometimes with faint indication of a blunt shoulder, rarely a definite shoulder with low knobs. Protoconch (from egg-capsule) 1½ whorls, diam. 3–3·5, alt. (i.e. apex to rostrum) 5 mm., smooth, later part of whorl with 6–8 feeble axial ribs, crossed by spiral lirae, *c.* 20 from suture to lower end of outer lip. Postnatal whorls 7; 10 axial ribs on 1st whorl, on 2nd and 3rd and sometimes 4th a similar number of slight undulations or low rounded knobs, obsolete on later whorls; crossed by numerous spiral lirae, varying in size, usually coarser and finer alternating, the larger ones sometimes with one or more striae, the peripheral lira sometimes distinctly stronger than its neighbours, almost a costa (*agulhasensis*), sometimes a pair of peripheral lirae stronger than the others. Parietal callus present, but weak in young and half-grown shells; columella pleats distinct. Outer lip evenly convex, not so distinctly incurved at beginning of canal as in *heynemanni*, plicate internally, edge at some stages of growth denticulate. Periostracum fibrous-fimbriate. 183 (tip of canal broken, about 5 mm. missing) × 75 mm. (type of *agulhasensis*); two False Bay examples (tip of canal broken in both) 145 × 52 mm. and 142 × 55 mm. Largest littoral example 81 (tip of canal broken) × 43 mm.

Operculum 28 × 14 mm. in 81 mm. shell.

Protoconch and first 2 (2½) whorls white, rest fulvous or chestnut-brown, operculum dark brown. Animal sealing-wax red with white dots on sides of foot (K.H.B.).

Radula: from protoconch in egg-capsule, 40 rows, lateral plate with 6 cusps; from 18 mm. shell 135 rows, lateral with 8 cusps; from 33 mm. shell 190 rows and 11–12 cusps resp.; from 85 mm. shell 225 rows and 12 cusps resp.; from 142 mm. shell 265 rows and 14–16 cusps resp. (in all cases excluding the tiny internal denticle); central plate quadrangular, with well-developed cusps, the middle one stronger than the side cusps.

Egg-capsule club-shaped, 20 mm. high, distally elliptical in section, major diam. 9 mm., minor diam. 8 mm., horny; only one specimen seen, containing

4 embryos, but the apex was open and some of the embryos had probably escaped.

Fossil, late Tertiary; Saldanha Bay (Haughton).

Dead. Natal (Krauss); False Bay (Strebel, coll. Fritsch); Cape Hangklip (S. Afr. Mus.); between Cape St. Blaize and Flesh Point, 28 fathoms (S. Afr. Mus. P.F. coll. type of *agulhasensis*).

Living. Steenberg Cove (St. Helena Bay) and Langebaan (Saldanha Bay), littoral (U.C.T.); Oudekraal, west coast of Cape Peninsula, littoral (U.C.T.); Sea Point, Cape Town, littoral (S. Afr. Mus.); Kalk Bay (False Bay), littoral (S. Afr. Mus.), and 4–5 metres (U.C.T.).

Remarks. The striae on the larger spiral lirae are not (in the specimens I have seen) so prominent as Strebel described in his specimens, and cannot be regarded as a specific character.

I have seen a 51 mm. shell from Cape Hangklip (S. Afr. Mus. no. 14052), and a 95 mm. shell from False Bay (U.C.T.) with distinct angular shoulders and two peripheral lirae. Another False Bay example 142 mm. long (U.C.T.) has 9 peripheral swellings on the 6th whorl, but none on the preceding whorls. The resemblance of these specimens to *heynemanni* is strong, but the latter species has finer and more regular lirae above the shoulder, and the shoulder projections are definitely knobs, not mere swellings or undulations; and the 2 peripheral lirae are situated in the middle of the whorl, not as in the *dunkeri* form of *heynemanni* adjoining the suture of the following whorl.

The contrast between the smooth slender examples and, e.g. the 95 × 46 mm. shouldered specimen is very striking, and is paralleled with the *adamsii* and *ocelliferus* forms of *Fusus verruculatus* (p. 90).

Littoral examples are smaller and stouter than off-shore forms (cf. *heynemanni*).

The 145 × 52 mm. shell from False Bay, 23 fathoms, was identified by Tomlin as *filamentosa* in spite of its having a parietal callus. It bridges the gap in size between the common littoral form and *agulhasensis*. The latter was contrasted by Tomlin with *scholvieni*, an obviously different species, but he did not mention any differences between his n. sp. and *lugubris*. In fact there are no differences.

Krauss said his *badia* was very like *Fusus mandarinus*, and also bore resemblance to *Fasciolaria fusiformis* and *filamentosa*.* There are no later records of *lugubris* from Natal, or indeed from east of Cape St. Blaize.

Fasciolaria trapezium Linn.

1880. Von Martens. *Mauritius & Seychellen*, p. 245.
1895. Cooke. *Cambr. Nat. Hist.*, iii, fig. 121 (radula).
1903. Smith. *Proc. Mal. Soc.*, v, p. 368 (*heynemanni*, non Dnkr.).

* See also *Fusivoluta pyrrhostoma* (Volutidae) for the *Gazelle* shells reported to be *Fusus mandarinus* (p. 30).

1911. Strebel. loc. cit., pp. 40 sqq. and vars. pls. 7–10, 13, 14, figs. 38–45, 48, 49, 61, 62.
1930. Fulton. *Ann. Mag. Nat. Hist.* (10), vi, p. 685, pl. 18, figs, 2, 2*a* (*strebeli*).
1952. Satyamurti. *Bull. Madras Govt. Mus.*, I, 2, pt. 6, p. 186, pl. 17, fig. 10.
1952. Braga. *Anais Est. Zool. Invest. Ultramar*, vii, 3, p. 73, pl. 2, fig. 1.

Aperture longer than spire. Profile of whorls with angular shoulder. Protoconch 1½ whorls, diam. 1·5 mm., smooth (Strebel, figs. 38, 42). Postnatal whorls 9 (? 10); spiral grooves only on early whorls but indicated on later whorls by dark lines; on 1st and 2nd (–3rd) whorls 8–9 axial ribs extending from suture to suture, but on later whorls gradually restricted to the periphery and forming knobs on the shoulder, which becomes definitely marked from 4th whorl onwards: 5–7 in forma *typica*, 8–11 in varieties. Parietal callus present, but weak in juveniles. Columella with 3 pleats, and often additional wart-like nodules anterior to the main pleat; canal straight or slightly sigmoid; outer lip internally with numerous plicae, usually a smooth zone between the plicae and the edge; the latter in some stages of growth denticulate. Up to 215 mm. long (f. *typica*); var. *ponderosa* 230 mm. (Strebel).

White or pinkish, with narrow brown spiral lines usually in pairs, plicae in aperture orange-brown, periostracum yellowish-brown.

Radula (only a portion removed from a 153 mm. shell); lateral plate with 30 cusps. Cooke's figure shows 22 cusps.

Dead. Durban (Sowerby, Smith); Natal (Fulton, and S. Afr. Mus.); Inhambane and Mozambique Island (Braga).

Living. 28° 28′ S. 32° 25′ E. (off Cape St. Lucia), 27 metres (s.s. *Africana*).

Distribution. Red Sea, Zanzibar, Querimba Is., Mauritius, Réunion, Seychelles, Madagascar, Indo-Pacific.

Remarks. The relatively small protoconch distinguishes this species from *heynemanni*, apart from other characters. Smith's mention of the small protoconch indicates that his two specimens were really young *trapezium*.

A Natal specimen, 53 × 24 mm. (S. Afr. Mus.) might certainly be regarded as *heynemanni* because it is unicolorous without any trace of the dark spiral lines so characteristic of *trapezium*; but it has the small protoconch (and narrower 1st and 2nd whorls) of *trapezium*.

The living specimen, 153 mm. long, dredged by the s.s. *Africana* has indications of double lines only on the latest part of the outer lip, and only feeble colourless plicae within; the base is quite smooth, without costae or lirae; the protoconch is broken off, but was probably small.

That the characteristic dark spiral lines are not always developed in juveniles and half-grown *trapezium* is shown by Smith's (size not given), Fulton's 69 mm., and the S. Afr. Mus. 53 mm. examples. In addition to the one Natal specimen, S. Afr. Mus. also has examples from extra-African localities. Even the 153 mm. *Africana* specimen was only just beginning to develop these dark lines.

Fulton's reasons for separating his *strebeli* from *heynemanni* were its more slender shape and absence of well-marked spiral lirae; Smith also mentioned

these characters. But neither Smith nor Fulton mentioned the *size* of the protoconch, which, according to Fulton's photographic figure, was small; nor did they compare their specimens with *trapezium*.

A further difference between *trapezium* and *heynemanni* is: the former develops six whorls against the latter's four, in half-grown specimens of approximately equal size.

Fasciolaria heynemanni Dnkr.
Fig. 18(*d*), 19(*d*)

1876. Kobelt in *Küster. Conch. Cab.*, p. 139, pl. 28, fig. 5.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 30.
1911. Strebel. loc. cit., p. 28, pl. 5, figs. 27, 28; and p. 31, pl. 6, fig. 29 (*scholvieni*); and p. 33. pl. 6, figs. 32, 32 *a*, *b* (*dunkeri*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 46, pl. 4, figs. 3, 3*a*, 3*b* (*alfredensis*).
1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, p. 6 (*alfredensis*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 49; and p. 49, pl. xi, no. 362 (juv. *dunkeri*, non Strebel); and p. 49 (*scholvieri*, typ. err.); and p. 49 (*alfredensis*).
Not: Smith. *Proc. Mal. Soc.*, v, 368 (= *trapezium*).

Spire 1½–2 times in aperture. Profile of whorls with angular shoulder. Protoconch 1½ whorls, large, diam. 3·5–4·5, alt. 3–4 mm., smooth, last half whorl with about 6 axial ribs, from suture to suture, continued on 1st postnatal whorl, but restricted to the periphery and forming knobs, 5–6 spiral lirae above the knobs, increasing to 8 or more on later whorls. Postnatal whorls 6, with peripheral knobs varying in size, and in number from 9–14. Spiral lirae over whole whorl, including the knobs; on base 8–10 more or less conspicuous very flat costae, each traversed by about 3–5 lirae; usually only one, but sometimes 2 (*scholvieni*) of these costae appear between the knobs and the suture of the following whorl. On the rostrum the spiral lirae become almost axial in direction (parallel with the canal), distinct in examples with straight rostrum but obscured by the growth-lines in those with costate rostrum. Parietal callus present. Columella with 3 pleats. Canal long, narrow, straight or slightly sigmoid, especially when left side of rostrum is thickened and costate. Outer lip slightly flattened in the middle and incurved below, not plicate internally, in some examples with denticulate edge. 203 (protoconch and tip of canal broken) × 80 mm.; slenderest specimen 160 × 55 mm.

Operculum 62 × 33 in 203 mm. shell.

Pale buff or white, unicolorous, periostracum usually chestnut-brown, but sometimes olivaceous golden-brown (Cape St. Blaize example) or golden-brown (False Bay example); protoconch white; operculum dark brown.

Radula with *c.* 230–280 rows, lateral plate with 15 cusps on one side, 16 on the other, in another specimen 17 and 18 (excluding the tiny internal denticle); middle cusp of the central plate asymmetrically bifid in one specimen.

Dead. Natal (Kobelt); Port Elizabeth, Port Alfred (Sowerby, Strebel, Bartsch, Turton, S. Afr. Mus.); Elim (i.e. Bredasdorp coast, Cape Agulhas area) (Strebel: *dunkeri*); 'Cape' (Strebel: *scholvieni*); off Glendower Beacon

(Port Alfred area), 66 fathoms (S. Afr. Mus. P.F. coll.). Delagoa Bay S. Afr. Mus. coll. K.H.B. 1912).

Living. Between Plettenberg Bay and St. Francis Bay, 100 metres (von Martens); off Cape Infanta, 34–40 fathoms (Odhner) (also dead examples); off Kowie, 40–43 fathoms; Algoa Bay, 40 fathoms; off Cape St. Blaize, 46 fathoms; False Bay (S. Afr. Mus. P.F. coll.). Cape Agulhas, littoral (U.C.T.).

Remarks. A variable species, as was recognized by Strebel. He figured the 'deep-water' and the 'coastal' forms. The former has a straight non-costate rostrum, the latter a costate rostrum. But the present series shows that this difference is not due to habitat, because both were obtained together in one haul off the Kowie (P.F.); nor does it seem to be sexual because out of 5 animals 2 ♂♂ and 1 ♀ are non-costate, 2 ♀♀ costate.

This costate thickening of the rostrum seems to appear only in specimens approximately 100 mm. in length upwards.

At the Kowie locality plump and slender examples were taken in the same haul: width approx. 2·2–2·8 in the length, spire varying from $1\frac{1}{2}$, $1\frac{3}{4}$, to 2 times in aperture (incl. canal), knobs 9 (in smallest specimen 58 mm. long) to 14 (the 2 largest examples 203 and 187 mm. had 11 and 13 knobs resp.).

The peripheral knobs are usually in the middle of the whorl, but may be lower (more anterior); in *dunkeri* they adjoin the suture, except on the last preserved whorl.

In some juveniles 2 subequal series of knobs are developed (cf. *dunkeri*).

It is difficult to decide where the protoconch ends and the 1st postnatal whorl begins. The apex of the subglobular protoconch ($1\frac{1}{2}$ whorls) is white, the 1st postnatal whorl brown, but there is no sharp division between the two. The axial ribs begin on the last part of the white region and are continued, without any obvious interruption of growth, on the brown 1st whorl. One specimen of protoconch is very large: diam. and alt. both 4·5 mm.

The curve of the outer lip helps to distinguish this species from *lugubris*, but not from *trapezium*.

Strebel suggested that *scholvieni* might possibly be a large form of the dwarf *heynemanni*; but the present material negatives this; the differences are merely individual.

Bartsch's *alfredensis* was based on a worn slender specimen. Although the plump, short-spired forms with strong knobs look different from the slender, high-spired forms with weaker knobs, the present S. Afr. Mus. material, meagre as it is, exhibits transitional forms.

F. dunkeri, based on one young specimen (41·5 × 19·3 mm.), I regard as an aberration. In some young examples of typical *heynemanni* the knobs on the early whorls are very close to the suture of the following whorl; and in some very young specimens a double row of feeble knobs occurs; but I have seen no specimen exactly corresponding with *dunkeri*, i.e. with a *double* peripheral shoulder *adjoining the suture*.

In spite of Kobelt's record from Natal, the Delagoa Bay locality is remarkable. I cannot doubt the provenance because I myself found the specimen. One would expect to find *trapezium* there, but the specimen is a typical *heynemanni* without a single one of the features distinguishing the Indo-Pacific species. It retains the periostracum, and is thus unlikely to have been carried very far by currents; moreover the Mozambique current sets in the wrong direction to have carried this shell from Natal or the Port Alfred area.

Gen. Latirus Mont.

1810. Montford. *Conch. Syst.*, ii, p. 530.
1840. Swainson. *Treat. Malac.*, lxxviii, p. 304 (*Plicatella*).
1891. Melvill. *Mem. Manch. Philos. Soc.*, n. ser. 4, vol. 4, pp. 365–411 (*Latirus* + *Peristernia*).
1911. id. *J. Conch.*, xiii, p. 164 (*Latirus* + *Peristernia*).

Shell ovate or fusiform, usually ribbed. Canal long or short, columella usually with pleats, aperture sometimes internally plicate. Operculum ovate, apex curved inwards, nucleus apical, internal surface as in *Fasciolaria* (? all species).

Radula central plate tricuspid, lateral plate with several cusps without intervening smaller denticles.

The South African species fall into two groups:

Whorls with peripheral knobs—
abnormis, *subcontractus*.
Whorls with axial ribs and spiral lirae—
polygonus, *clausicaudatus*, *bairstowi*, *rousi*, *alboapicatus*, *turritus*.

No living examples of *bairstowi* Sow. 1886 or *rousi* Sow. 1886 have yet been found. The only South African record of *turritus* (Gmelin) is a dead shell from Durban (Sowerby 1897); the species occurs at Mauritius, Seychelles, Ceylon, etc.

Latirus abnormis Sow.

1894. Sowerby. *J. Conch.*, vii, p. 6.
1897. id. *Append. Mar. Sh. S. Afr.*, p. 8, pl. 6, fig. 7.
1902. id. *Mar. Invest. S. Afr.*, ii, p. 96, pl. 2, fig. 1 (*imbricatus*).
1903. id. ibid., p. 227.
1911. Melvill. *J. Conch.*, xiii, p. 165.

Aperture (incl. canal) a little longer than spire. Protoconch 2 whorls, diam. 1·7, alt. 1·3–1·5 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 7, profile concave above the periphery, in some specimens rather strongly so, almost forming a subsutural groove. Axial ribs 10 on 1st whorl, well marked on periphery but feeble above and below, decreasing to 7–8 peripheral knobs on later whorls; crossed by 4–5 spiral lirae on 1st whorl, increasing by interpolation on later whorls, but evanescent on 6th and 7th whorls; 2 of the peripheral lirae on whorls 2–5 stronger than the others, making the knobs subcarinate, but obsolete on knobs on 6th and 7th whorls; spiral

lirae continued on base, 2 of them in upper third (at posterior end of aperture) stronger than the others and forming a series of feeble subcarinate knobs corresponding in position with the peripheral knobs. Parietal callus weak; columella without pleats. Canal not abruptly separated from rest of aperture, which is posteriorly more or less indented; columella glaze in large specimens discrete from rostrum forming a narrow umbilicus; outer lip not plicate within. Periostracum thin, fibrous, imbricate-scaly. 72 × 29 mm. (S. Afr. Mus.); Brit. Mus. specimen (when perfect) probably 75 mm. long (Smith).

Operculum ovate, gently curved, 13 × 6·5 mm. in 49 mm. shell, internal surface as in *Fasciolaria*.

Ochraceous salmon, or orange-brown, periostracum amber-brown, operculum brown.

Living. Off Durnford Point (Zululand), 13 fathoms (S. Afr. Mus. P.F. coll.).

Dead. Natal (probably from fish stomachs) (Smith); off Tugela River, 46 fathoms (Sowerby), and 14 fathoms (S. Afr. Mus. P.F. coll.).

Latirus subcontractus (Sow.)

1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 97, pl. 2, fig. 2 (*Fusus s.*).
1932. Tomlin. *Ann. S. Afr. Mus.*, xxx, p. 158, fig. 2 (*mosselensis*).

Aperture a trifle longer than spire. Protoconch 2 whorls, diam. 1·3, alt. 1 mm. smooth, beginning of 1st postnatal whorl distinct (type of *mosselensis*). Postnatal whorls 8; 9 (? 10) (*subcontractus*) or 8 (*mosselensis*) axial ribs on each whorl, from suture to suture on 1st–3rd whorls, but from 4th whorl restricted to the periphery; crossed on 1st whorl by 5 spiral lirae, increasing on following whorls, but from about the 5th whorl evanescent, except the peripheral lira which persists on the knobs (not in the intervals) making these subcarinate; on base a second series of weaker subcarinate knobs, and a few weak lirae on rostrum. Parietal callus weak, columella with 2 obscure pleats (*mosselensis*); canal rather abruptly demarcated from rest of aperture, narrow (*subcontractus*). A narrow umbilicus (*mosselensis*); outer lip not plicate internally. Periostracum thin, smooth. 40 × 18 mm. (*subcontractus*); 53·5 × 23 mm. and 60 × 25 mm. (type and figure of paratype of *mosselensis*).

Operculum ovate, gently curved (Tomlin).

Pale pinkish, periostracum yellowish-brown (*mosselensis* type).

Dead: off Cape Natal (Durban), 200 fathoms (Sowerby).

Living: Mossel Bay, 27 fathoms (Tomlin) (both S. Afr. Mus. P.F. coll.).

Remarks. Has a strong resemblance to a *Fasciolaria*, cf. *heynemanni* or *trapezium*.

Type of *subcontractus* ? in British Museum. Tomlin figured the paratype (? in coll. Tomlin) with operculum, and the back view of the type of *mosselensis*. The latter is in S. Afr. Mus. without operculum. The radula was not described.

Tomlin compared his species with *L. armatus* A. Adams 1854 (see 1886. *Challenger Rep.*, xv, pl. 13, fig. 1, *Fasciolaria armata*), but made no reference to the truly remarkable resemblance to Sowerby's species.

Except that *subcontractus* appears (from Sowerby's figure) to have one (? 2) more axial ribs (knobs) than *mosselensis*, and that the latter is rimate and has a slightly curved columella, there are no differences between Sowerby's figure and the type of *mosselensis*. The lower part of the canal and outer lip are broken in the latter, which may account for the umbilicus being visible.

In spite of the distance apart of the two localities, and the difference in depth, one cannot accept more than the one species.

Latirus polygonus (Linn.)

1816. Lamarck. *Tabl. Encyclo.*, pl. 423, fig. 1 (*Fusus p.*).
1859. Chenu. *Man. Conchyl.*, i, fig. 908.
1903. Smith. *Proc. Mal. Soc.*, v, p. 369 (var.).

The only South African record is from 'Durban, deep water' [probably from fish stomach] (Smith). The species occurs at Mauritius, and other localities in the Indian Ocean. Specimens in S. Afr. Mus. from Ceylon (coll. Rawson W. Rawson).

The coloration appears to be distinctive: buff or ochraceous, with brown axial ribs divided into oblong patches by the pale spiral lirae.

Latirus clausicaudatus (Hinds)

1844. Hinds. *Zool. Voy. Sulphur. Moll.*, p. 13, pl. 1, figs. 10, 11 (*Fusus c.*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 3 (*Fusus c.*).

Elongate-fusiform, turreted, aperture (incl. canal) $1\frac{1}{4}-1\frac{1}{3}$ times spire. Profile of whorls evenly convex. Protoconch $2\frac{1}{2}$ whorls, diam. and alt. 2 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 7; 7 axial ribs on 1st whorl, increasing to 8 or 9 on last whorl, from suture to suture but becoming weaker above periphery on later whorls, and evanescent on lower two-thirds of base; sometimes indistinct on last part of 7th whorl, but reappearing as a well-marked rib on outer lip; crossed by spiral lirae, 7–8 on 1st whorl increasing to 16–20 on later whorls, 35–40 additional on base. Parietal callus bluntly dentiform; columella with 2 pleats, the anterior one distinct, the other obscure; canal abruptly marked off from rest of aperture, very long, nearly twice the rest of aperture, nearly closed throughout its length by the discrete edge of the columella glaze, no umbilicus. Aperture internally without plicae except one at base of canal opposite the columella pleat. Periostracum thin, smooth. 51 × 15·5 mm., smallest specimen in S. Afr. Mus. 31 mm. long. Hinds's figure 58 × 16·5 mm.

Operculum oval, apex incurved, 7 × 3·5 mm. in 45 mm. shell.

White or pale buff, periostracum pale greyish brown, operculum dark brown.

Dead: Agulhas Bank, 50–60 fathoms (Hinds). Off Cape Natal (Durban), 54 fathoms; off Cape Morgan, 77 fathoms; off Nahoon Point (East London), 45 fathoms; off Hood Point (East London area), 49 fathoms; off Nanquas Peak (eastern part of Algoa Bay), 63 fathoms; Algoa Bay, 37 fathoms; (S. Afr. Mus. P.F. coll.).

Living: off Riet Point (east of Algoa Bay), 23 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. These specimens are clearly referable to Hinds's species, which Sowerby (1892, also 1903. *Mar. Invest. S. Afr.*, ii, p. 97) said was represented by the unique type in the British Museum.

In one specimen the protoconch and 3 whorls are slightly curved to the right, and in another the protoconch is curved to the left as in Hinds's figure.

The animal of the only specimen taken alive was not preserved.

Latirus alboapicatus Smith

1902. Smith. *J. Conch.*, x, p. 250, pl. 4, fig. 5.
1906. Smith. *Ann. Natal Mus.*, i, p. 34, pl. 7, fig. 7 (*burnupi*).
1911. Melvill. *J. Conch.*, xiii, p. 166 and p. 168 (*burnupi*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 433.

Fusiform. Profile of whorls slightly angularly convex (fig. of *alboapicatus*), slightly concave above, then gently convex (*burnupi*). Protoconch 2 whorls, diam. and alt. *c.* 1·5 mm., smooth. Postnatal whorls 6; axial ribs *c.* 12 (*alboapicatus*) on 1st whorl (in *burnupi* corroded), 8 on 2nd and following whorls, from suture to suture, but more prominent on the periphery, and evanescent on base; crossed by spiral lirae (number not stated in *alboapicatus*) 5 on 2nd whorl increasing to 8–10 on last whorl, the first one or first 2 or 3 below suture granulose, 9–11 additional on base, of which the 4th or 5th is stronger than the others, covered posteriorly by the parietal callus and forming a small denticle on outer lip; columella with 3 weak pleats, canal straight (slightly recurved in *alboapicatus*), distinctly but not abruptly marked off from rest of aperture, umbilicus slight or absent, outer lip sometimes plicate internally. Periostracum thin, smooth. 28 × 11·5–12 mm.

Operculum (*burnupi*) ovate, apex incurved, 6 × 3 mm. in 28 mm. shell.

Rufous with white apex, and a pale band below centre of body whorl, aperture rufescent within (*alboapicatus*); white with brown periostracum, the strong lira on base showing as a pale line, aperture rosy or purplish within, operculum dark brown (*burnupi*) (see Remarks).

Dead: (*alboapicatus*) Durban (Tomlin). Living: (*burnupi*) Port Shepstone (Natal) (Smith, also S. Afr. Mus. Ross-Frames coll. ex Burnup).

Remarks. Although Smith must have had his *alboapicatus* for comparison when he described *burnupi*, and Melvill accepted both species, I strongly suspect

that the two are conspecific. As I have seen no specimens of the former species, the description is based mainly on specimens of *burnupi* collected in the type locality by Burnup.

Like Smith's specimens, all these are more or less corroded at the apex, so that the true size of the protoconch or the sculpture of the 1st whorl cannot be determined.

Tomlin (1931) records (*fide* Burnup) a specimen of *alboapicatus* 44 (45) × 16·5 mm. (!), of which Burnup said the ribs and growth-lines were paler than the intervening spaces, and the spiral grooves much darker than the lirae. This applies also to Burnup's specimens of *burnupi* in S. Afr. Mus.

Gen. Peristernia Mörch

1852. Mörch. *Cat. Conch. Yoldi.*, i, p. 99.
1891. Melvill. *Mem. Manch. Philos. Soc.* (4), iv, p. 365 (*Latirus* part).
1911. id. *J. Conch.*, xiii, p. 164 (*Latirus* part).
1935. Yen. *Notes Malac. Chinoise*, i (2), p. 41 (*Peristerina* emend.).

Shell broadly fusiform, more or less distinctly axially ribbed and spirally lirate, the lirae often scabrous or squamose; not or only slightly umbilicate, canal moderate, slightly recurved, columella usually with 2 pleats, aperture internally plicate. Operculum as in *Latirus*.

Radula: central plate piriform, narrowed in front, with 3 feeble cusps, and lateral plate with denticles between the main cusps.

Included conchologically in *Latirus*, by Melvill, but can be distinguished by the radula.

Peristernia leucothea Melv.

Fig. 19(*e*)

1891. Melvill. loc. cit., p. 399, pl. 2, fig. 15.
1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 1, pl. 1, fig. 2 (*Euthria eburnea*).
? 1932. Turton. *Mar. Sh. Pt. Alfred*, p. 54, pl. 12, no. 400 (*Euthria ordinaria*).
1937. Peile. *J. Conch.*, xx, p. 300, fig. 1 (radula).

Length about twice breadth. Aperture subequal to spire. Protoconch 1½ whorls, diam. 0·8, alt. 0·75 mm., smooth, 2 riblets close together before junction with 1st postnatal whorl. Postnatal whorls 7; axial ribs 9–10 on 1st whorl, increasing to 11–12 on last whorl, from suture to suture but more prominent peripherally, evanescent on base; crossed by spiral lirae, 3 on 1st and 2nd whorls, 4 on 3rd, 5–6 on 4th, increasing to 10–11 on last whorl, often with intermediaries, 10–12 additional on base, also with intermediaries, usually one or two at about the middle of base stronger than the others; fine close-set growth-lines producing punctae in the sulci between the lirae. Parietal callus present, columella with 3 pleats but usually only 2 or one distinct, forming a short keel at beginning of the short canal. Outer lip internally plicate, the 1st

(posterior) and last (opposite columella pleat) plicae larger than the others, more or less dentiform. Columella glaze sometimes rimate anteriorly forming a feeble umbilicus. Periostracum very thin. 25 × 12 mm.

Operculum ovate, apex incurved, 4·5 × 2·5 mm. in 22 mm. shell, internal surface as in *Fasciolaria*.

Creamy-white or pale buff, unicolorous; or orange-brown with markings, the colour when present is mostly around the suture, between the ribs, and in one or two bands on base, aperture internally white or pale brown, or pale violaceous, operculum chestnut-brown, periostracum yellowish-brown.

Radula with 250–270 rows, lateral plates with 9–11 (12) cusps and denticles, not always symmetrical and the sequence of cusps and denticles varying from one part of the radula to another.

Dead: Port Natal (Durban) (Melvill), Isipingo and Umkomaas (Natal) (Smith), Tongaat (Natal) (S. Afr. Mus.); Pondoland (Sowerby: *eburnea*); Port Alfred (Turton: *ordinaria*).

Living: off Durnford Point (Zululand) 13 fathoms (S. Afr. Mus. P.F. coll.); Scottburgh (Natal) littoral (S. Afr. Mus. coll. K.H.B.); Umpangazi, Umhlali, Durban, Umtwalumi, Port Edward and Port St. Johns (U.C.T.).

Remarks. The apex is usually corroded in littoral specimens; only one of the numerous Scottburgh specimens had a complete unworn protoconch.

Appears to be an 'albino' form of *nassatula*, as there is no conchological difference between the two. Of the specimens I have seen, those most strongly marked with orange-brown come from Umhlati, Tongaat, and Durban. Others from the last locality are uniform white or buff; one of the Umpangazi shells has a pale violaceous aperture. For the present retained separate from *nassatula*.

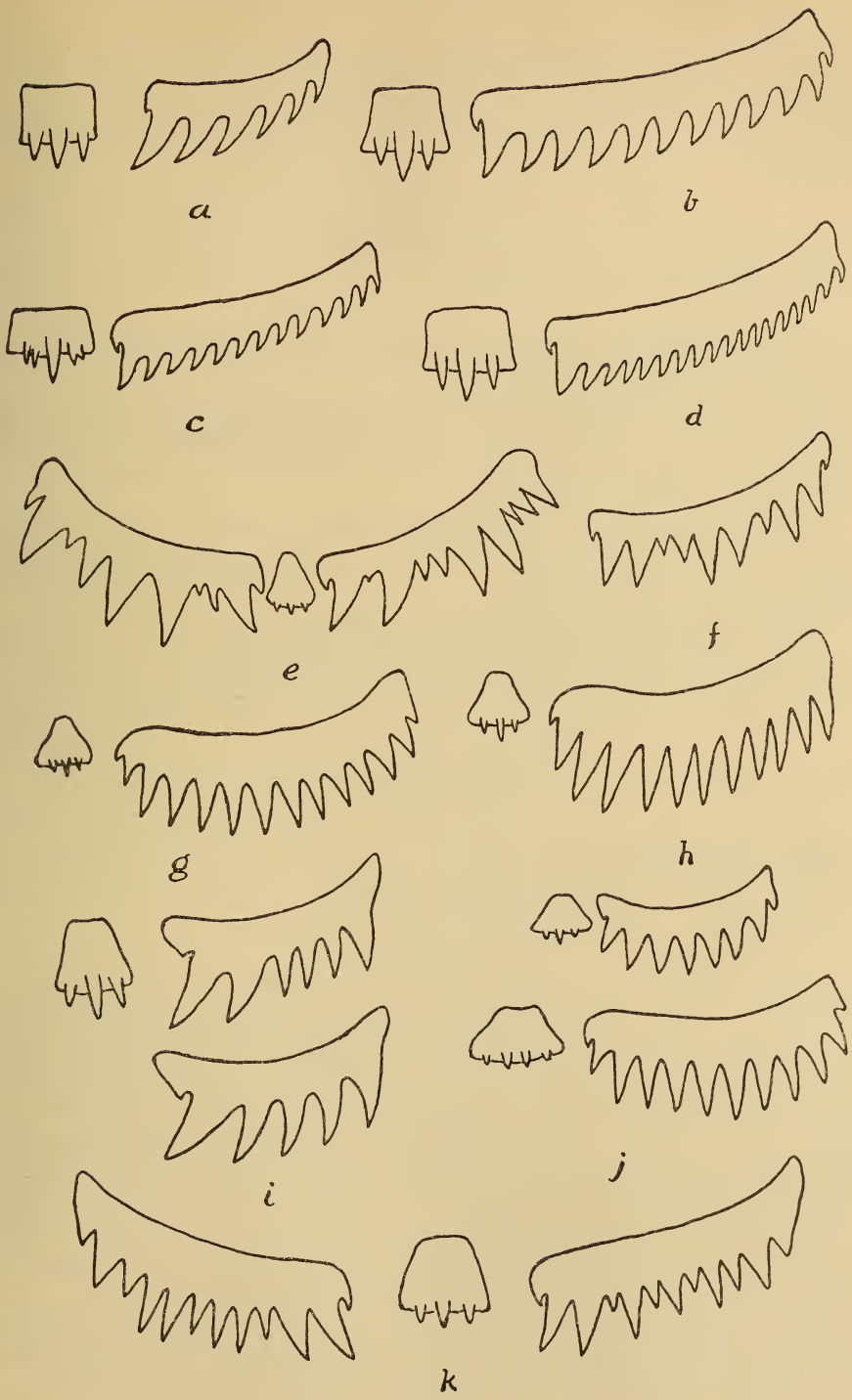
One specimen with an aberrant operculum: oval, nucleus intramarginal in apical third of length.

A series of water-worn specimens (S. Afr. Mus. locality?) is interesting. The effect of wear is to broaden the ribs and reduce the intervening grooves in which the spiral lirae, or their intervening sulci, persist, though much reduced. Even when completely worn away at the upper part of a whorl, they usually persist in the lower part adjoining the suture of the following whorl. The final result—a perfectly smooth shell—appears to be represented by Turton's *ordinaria* from Port Alfred, the locality farthest removed from the habitat of the living animal.

Even badly worn specimens, however, are too broad to be mistaken for *fuscotincta*.

FIG. 19. ——→

Central and lateral radula plates of (*a*), (*b*) *Fasciolaria lugubris* Rve. from juvenile from egg-capsule, and from 85 mm. shell; (*c*) *F. rutila* Watson; (*d*) *F. heynemanni* Dnkr.; (*e*) *Peristernia leucothea* Melv.; (*f*) *P. fuscotincta* (Sow.); (*g*) *Fusus verruculatus* Lam.; (*h*) *F. faurei* n. sp.; (*i*) *F. rubrolineatus* Sow., two variants of lateral plates; (*j*) *F. colus* Linn., half-grown and adult, the latter with abnormal 4-cuspid central plate; (*k*) *F. africanae* n. sp.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P. incarnata Desh., recorded from Natal (Sowerby 1892) (occurs also at Mauritius, Red Sea, and Indo-Pacific) differs from *leucothea* in having fewer spiral lirae on last whorl (6–7 in Philippine specimens in S. Afr. Mus.), and in coloration, which is yellow or orange with brown intervals between the ribs.

Peristernia nassatula (Lam.)

1859. Chenu. *Man. Conchyl.*, i, fig. 910.
1880. Von Martens. *Mauritius & Seychellen*, p. 246 (*Plicatella n.*).

The description given for *leucothea* will apply to this species which is, however, more brightly coloured.

Cream, upper half of whorls and the grooves between the ribs brown, shading off into orange-brown, base with a pale spiral band at level of top of aperture, followed by a dark brown band and then another pale band, rostrum orange-brown, aperture violaceous.

Radula (one specimen from Delagoa Bay examined) incomplete but with at least 180 rows, lateral plate with (8) 9–10 cusps and denticles, varying in size and sequence as in *leucothea*.

Natal (Krauss, ? dead). Delagoa Bay, living (U.W.).

Distribution. Mauritius, Réunion, Seychelles, East Indies.

Peristernia fuscotincta (Sow.)

Fig. 19(*f*)

1886. Sowerby. *J. Conch.*, v, p. 2 (*Euthria f.*).
1889. id. ibid., vi, pl. 1, fig. 18.
1892. id. *Mar. Sh. S. Afr.*, p. 4, pl. 1, fig. 13 (*Euthria f.*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 99, fig. 36 (radula).
1947. Stephenson. *Ann. Natal Mus.*, xi, pp. 271, 273 (*Cominella f.*).

Length distinctly more than twice breadth. Aperture shorter than spire. Protoconch 2 whorls (all specimens worn). Postnatal whorls 5; faint indications of weak ribs on upper 2 or 3 whorls; all whorls with spiral grooves, 4 on 2nd whorl increasing to 10–11 on last whorl, usually in pairs, and punctate where crossed by the growth-lines, 9–10 additional on base, some in pairs. Parietal callus present, columella with 3 pleats, but only one or two distinct, forming a short keel at beginning of the short canal. Outer lip internally plicate, 1st and last plicae larger than the others. Sometimes a feeble umbilicus. 20 × 8 mm.

Operculum oval, apex incurved.

White with irregular brown markings, either as patches or axial flames, usually a more or less continuous brown band below periphery.

Radula with 140–160 (Peile: 167) rows, lateral plate usually with 6 major cusps with intervening denticles (1 or 2); the arrangement varies in successive rows, and is not always symmetrical on the two sides (cf. *leucothea*).

P. fuscotincta: dead; Port Elizabeth, Port Alfred (Sowerby, Bartsch, Turton); Port Shepstone (Natal) (S. Afr. Mus. coll. Burnup).

Living: Port St. Johns to Richmond (Alexandria Division) (Stephenson); East London to Kleinmond (Bathurst Division) (U.C.T.).

Remarks. In *fuscotincta* the spiral grooves were described as very obscure (they certainly are in beach-worn specimens!).

Some of the beach-worn specimens in S. Afr. Mus. are almost wholly white, but even so the subperipheral band and a few brown marks are just visible.

Stephenson (1947 p. 271 footnote) transferred this species to *Cominella* (*Afrocominella*) seemingly at Tomlin's suggestion—a clear case where conchological guessing proved wrong—although Peile's examination of the radula had already (1938) put the species in its correct genus.

Gen. Fusus Brug.

1789. Bruguière. *Encycl. Meth.* (1), xv.

Shell more or less elongate-fusiform spire often high. Canal moderately or very long; columella without pleats but sometimes rimate.

Operculum oval or piriform apex blunt more or less incurved or sharply pointed, nucleus apical, internal surface with marginal thickening as in *Fasciolaria*.

Radula, central plate subtriangular, narrowed in front, tricuspid, lateral plate with several cusps, without intermediate denticles.

Remarks. F. radialis Watson has proved, not unexpectedly, to be a *Columbarium* (p. 234), and *F. speratus* a *Tritonalia* (p. 215).

Fusus africanus (Sow.)

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 1, pl. 6, fig. 19.
1903. Smith. *Proc. Mal. Soc.*, v, p. 368, pl. 15, fig. 19.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 50, pl. xi, no. 370 (*kowiensis*).

Piriform. Aperture (excl. canal) a little longer than spire (incl. canal: $2\frac{1}{3}$–$2\frac{1}{2}$ times spire). Profile of early whorls nearly straight, of later whorls angular. Protoconch 2 whorls, smooth (but no perfect specimen seen). Postnatal whorls 6; on first 3 whorls 10–11 very obscure axial ribs, reduced on following whorls to peripheral rounded knobs, which become stronger on last 2 whorls: on 4th whorl near suture, on 5th and 6th nearer middle of whorl; crossed by spiral lirae, 5 on 1st whorl, increasing to 8–9 (10) on 4th whorl but thereafter evanescent; on base 12–15 low blunt costae, evanescent towards end of rostrum. A blunt parietal callus, columella curved, glaze discrete forming an umbilical rimation; canal long, straight, narrow, distinctly marked off from

rest of aperture; outer lip not plicate within. Periostracum thin. 104 × 52 mm. (Turton); 79 (protoconch missing) × 38 mm. (S. Afr. Mus.).

Operculum and radula unknown.

Creamy, buff, pale orange-brown, with darker marks between the knobs and sometimes axial flames, grooves between costae on base orange-brown, periostracum brown.

Port Elizabeth (Sowerby); Port Alfred (Turton: *kowiensis*); off Durban [from fish stomachs] (Smith, also S. Afr. Mus.).

Remarks. Only dead specimens known. Except for Sowerby's original young specimens, and Turton's specimen, this species has only been obtained from fish stomachs in Natal waters. Not taken by the *Pieter Faure*.

Fusus verruculatus Lam.

Figs. 19(*g*), 20(*a*)

1816. Lamarck. *Tabl. Encycl. Meth.*, p. 429, fig. 7, and Liste, p. 7 (*ocelliferus*, name and figure only).
1822. Id. *Anim. sans Vert.*, vii, p. 129.
1870. H. Adams. *Proc. Zool. Soc. Lond.*, p. 110, text-fig. (*ventricosus*, non Gray).
1876. Kobelt. *Conch. Cab.*, p. 152, pl. 47, fig. 3 (*adamsii*).
1886. Watson. *Challenger Rep.*, xv, p. 195 (references).
1892. Sowerby. *Mar. Sh. S Afr.*, p. 3 (*robustior*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 184, pl. 32 (20), fig. 19 (juv. referred with ? to *capensis* Thiele).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 50 (*ocelliferus* and *robustior*), pl. xi, no. 369 (*robustior* juv.).

Aperture (incl. canal) 1⅓ to nearly 1½ times spire. Profile of early whorls slightly angular, of later whorls angular (with knobs) (*verruculatus*), convex (*adamsii*). Protoconch 2½ whorls, diam. and alt. 1·5–1·75 mm. (rarely perfect except in juv.), smooth but with some irregular plicae before the abrupt junction with 1st postnatal whorl. Postnatal whorls 8; axial ribs 9–10 on 1st whorl, increasing to 11, usually from suture to suture on first 3 whorls, but thereafter only at periphery where they become blunt, more or less complanate knobs, 11–15 in number, continuing on to 8th whorl forming a prominent shoulder in typical *verruculatus*, but petering out on 7th or 8th whorl in *adamsii*; crossed by spiral lirae, 3 (4) on 1st whorl, increasing to 5 (6) on 2nd and 3rd whorls, 2nd and 3rd lirae strongest, thereafter the 3rd strongest, on the periphery and carrying knobs, i.e. 2 lirae above and 2 (sometimes 3) below the peripheral keel; 15–20 additional lirae on base, with intermediaries; also over the whole whorl fine spiral striae. Parietal callus not strong, sometimes in addition with 3–4 (up to 6) plicae; columella curved, rimate in half-grown to adult examples, forming a deep but narrow umbilicus. Canal nearly straight in juv., usually more strongly curved in older examples, subequal to and not sharply marked off from rest of aperture. Outer lip at some stages of growth plicate within. Periostracum thin, fibrous and imbricate, especially near the suture, fimbriate.

(*verruculatus*) 150 (protoconch and tip of rostrum broken, say: 153) × 70 mm.; 119 × 45 mm.; (*adamsii*) 133 × 48 mm.; 125 × 50 mm.

Operculum oval, apex incurved, 35 × 18 mm. in 125 mm. shell.

Cream or buff, the peripheral knobs usually reddish-brown, sometimes also indications of orange flames, periostracum greyish or yellowish-brown, operculum horny or reddish-brown; juveniles seem to be more brightly coloured (at least in some beach-worn examples the coloration shows better), with darker knobs and flames.

Animal bright red with minute white specks (K.H.B.).

Radula in 7 mm. shell with 110 rows, lateral plate with 7 cusps, in 23 mm. shell resp. 165 and 8, in 25 mm. shell resp. 170 and 8, in 30 mm. shell resp. 205 and 9, in 38 mm. shell resp. 215 and 9, in 62 mm. shell resp. 230 and 11–12, in 114 mm. shell resp, 285 and 12, in 150 mm. shell resp. 325 and 13 (the tiny denticle at inner end excluded in all counts).

Dead and beach-worn specimens recorded from Port St. Johns, Port Alfred, Port Elizabeth, Agulhas Bank, Still Bay, False Bay (Sowerby, Adams, Bartsch, Turton and S. Afr. Mus.).

35° 16′ S. 22° 26′ E., 155 metres (Thiele, juv.).

Living: Simon's Bay (False Bay), 15–20 fathoms (Watson); Algoa Bay and Agulhas Bank to mouth of False Bay, 10–66 fathoms (S. Afr. Mus. P.F. coll.). Sea Point (Cape Town), low tide (S. Afr. Mus.), Knysna, low tide (S. Afr. Mus. P.F. coll.). Both the latter *adamsii* form). 33° S. 28° 11′ E. (off East London), 31 fathoms (*verruculatus* form) (U.C.T.).

Saldanha Bay, 10–14 fathoms (S. Afr. Mus. P.F. coll.).

34° 35′ S. 19° 14′ E., 66 metres; False Bay, 3–24 metres; west coast of Cape Peninsula, intertidal; Langebaan (Saldanha Bay); off Lambert's Bay, 66 metres (U.C.T.).

Remarks. The East London locality bridges the gap between Port St. Johns and Port Alfred.

The *verruculatus* and *adamsii* forms are not restricted to separate areas.

Juveniles from 5 mm. long (protoconch plus 1st whorl) examined.

While the early whorls show little variation, the later whorls show marked dimorphism: the typical *verruculatus* with strong shoulder knobs, and *adamsii* with evanescent knobs and evenly convex whorls. The institution of *adamsii* as a distinct species is not surprising when only the extreme forms were available. But they are connected by transitional forms.

Plump and slender examples occur in both *verruculatus* and *adamsii*, though the latter in general is the more slender. The most slender specimen I have seen is one (*adamsii*) taken in False Bay measuring 118 × 40 mm.; it is not scalariform but the spire is elongated to such an extent that its length equals the length of aperture (incl. canal).

In the early whorls the axial ribs are usually well developed (see Thiele's figure), and the bicarinate periphery on the 2nd and 3rd (sometimes also but less conspicuous on 4th) whorls is very characteristic.

One specimen (S. Afr. Mus. no. A4661, off Cape St. Blaize) 82 mm. long, and a juvenile (locality ?) 20 mm. long, have unusually large protoconchs: diam. and alt. almost 2·3 mm.

Another specimen, also from off Cape St. Blaize, 147 × 57 mm., has peripheral knobs extending on to the 8th whorl but the profile is convex, not shouldered; and the canal is markedly sigmoid.

One specimen (S. Afr. Mus. no. A4662, off Cape St. Blaize) 137 (tip of canal broken, probably 140–142 when perfect) × 66 mm., is subscalariform, with strongly convex ventricose whorls, and deeply sunken sutures.

It is a question whether the name *ocelliferus* in Lamarck's *Liste des objets* (sometimes attributed to Bory, but see: Sherborn & Woodward. *Proc. Zool. Soc. Lond.*, 1893, p. 584) should be used for this species. The figure is recognizable as a representation of this species, but is it adequate to distinguish it from other species?

Fusus colus Linn.

Figs. 19(*j*), 20(*b*)

1816. Lamarck. *Tabl. Encycl.*, pl. 423, fig. 2, and Liste, p. 6 (*longicauda*).
1859. Chenu. *Man. Conchyl.*, i, fig. 597.
1876. Kobelt. *Conch. Cab.*, p. 146, pl. 30, fig. 3, pl. 47, fig. 1.
1942. Gravely. *Bull. Madras Govt. Mus.*, V, 2, p. 62, fig. xi, i (*longicauda*).
1952. Satyamurti. ibid., n.s. I, 2 (6), p. 187 (*longicauda*).

Protoconch 2½ whorls, diam. 1, alt. 1·3 mm., smooth, with a dozen or more fine axial ribs in last half whorl, which is more or less sharply demarcated from 1st postnatal whorl.

Radula in 25 mm. shell with 80 rows, lateral plate with 8 cusps, in 40 mm. shell resp. 140–170 and 8–9, in 97 mm. shell *c.* 220 and 11 (excl. the minute inner denticle); central plate broader than long, narrowed in front, tricuspid (in one specimen 4-cuspid).

Living: off Umhloti and Umvoti Rivers (Natal), 25–27 fathoms; off Amatikulu River (Zululand), 24 fathoms (S. Afr. Mus. P.F. coll.). Delagoa Bay (S. Afr. Mus. coll. K.H.B., and U.W.). Inhambane (U.C.T.).

Dead: off Tongaat and Umhlanga (Natal), 22–36 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. F. toreuma (Martyn), recorded from Natal by Smith (1903), is distinguished by the angular profile of the whorls. If the Natal specimen was taken from a fish stomach, the species is probably living in South African waters.

Fusus torulosus Lam.

1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 423, fig. 4, and Liste, p. 6.

Specimen in S. Afr. Mus., probably from Ceylon or Indian Ocean. Aperture (incl. canal) longer than spire. Protoconch missing. Postnatal

whorls 10; profile convex with crenulations due to the spiral lirae. Axial ribs 5–6 on 1st and 2nd whorls, increasing to 10–11 on last, broad and rounded, from suture to suture; crossed by sharp spiral lirae 4–5 on 1st whorl, increasing to 10–11 on last, with an intermediary between the peripheral pair; *c.* 35 additional lirae on base and rostrum, some of them feebler than others. Growth-lines distinct immediately below suture, more or less so between the lirae on rest of whorl. Sutures deep. 91 (protoconch missing) × 24 mm.

A fragment of two half whorls exactly agreeing with the sculpture of the above described specimen: off Cape Natal, 85 fathoms; off Umhloti River, 40 fathoms, 2 worn fragments; off O'Neil Peak (Zululand), 90 fathoms, one worn fragment (S. Afr. Mus. P.F. coll.).

Fusus rubrolineatus Sow.

Fig. 19(*i*)

1870. Sowerby. *Proc. Zool. Soc. Lond.*, p. 252.
1880. id. *Thes. Conch.*, iv, p. 80, pl. 411, fig. 68.
1903. id. *Mar. Invest. S. Afr.*, ii, p. 228.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 30.
1903. Thiele. ibid., p. 169, pl. 9 (4), fig. 60 (radula).
1915. Bartsch. *Bull U.S. Nat. Mus.*, 91, p. 47.

Aperture (incl. canal) 1–1¼ times spire. Protoconch 2½ whorls, diam. and alt. 1·2 mm., smooth, with 4–6 axial ribs on last half whorl, junction with 1st postnatal whorl distinct. Postnatal whorls 7; axial ribs 14–15 on 1st whorl, increasing to 17–18 on last whorl, from suture to suture, but evanescent towards suture on last whorl and on lower half of base, from about the 4th whorl slightly curved below the suture; fine close-set growth-lines; crossed by 3 spiral lirae which appear alone on 1st whorl and continue as 3 main lirae on all following whorls but with added intermediaries (e.g. on 6th whorl 6–7 between suture and 1st main lira, 3 between 1st and 2nd, and between 2nd and 3rd, 3–4 below 3rd lira); 15–20 additional lirae on base, those on upper half with intermediaries; main lirae on the whorls and upper half of base forming horizontal complanate nodules at intersections with axial ribs. No parietal callus, columella slightly curved, in some specimens with a slight swelling (scarcely a pleat) at the bend. Canal shorter than, but not marked off from rest of aperture, slightly curved. Periostracum thin, smooth. 38 × 13 mm., a plump specimen 32 × 13 mm.

Operculum broadly oval, apex rounded, slightly on *outer* side of median line (von Martens said toward inner side), 6 × 4 mm. in 35 mm. shell, internal surface as in *Fasciolaria*.

Pale buff, main lirae on whorls and base, and also some of the more prominent intermediaries orange-brown, forming spiral lines, usually continuous but often more intense on the axial ribs, producing an effect of series of spots or axial flames.

Radula with 150–180 rows, central plate longer than wide, narrower in front, with 3 rather strong cusps, lateral plate with 5–6 cusps (excl. inner denticle), varying in size, and often asymmetrical.

Agulhas Bank (Sowerby 1870); 35° 16′ S. 22° 26′ E., 155 metres (von Martens); off Cape St. Blaize, 53 fathoms (Sowerby 1903).

Living and dead: Agulhas Bank, from approximately 22° E. to 27½° E., and southwards to Brown's Bank approx. 36½° S., 63–124 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Von Martens (loc. cit. 1903. p. 103, pl. 2, fig. 10) described *rufinodis* from off Zanzibar and Sumatra, and compared (p. 104) it with *rubrolineatus*. But he seems to have compared his specimens with Sowerby's figure instead of with actual specimens of *rubrolineatus* which were available to him. The differences are not very convincing and the two species are obviously closely allied. *F. rufinodis*, however, has only 10 axial ribs on the 7th (penultimate) whorl and 11–12 on the 8th whorl; and the central plate of the radula (Thiele, loc. cit., fig. 59) is nearly square.

An even more closely allied species is *F. libratus* Watson 1886 from Fiji Islands, 315 fathoms.

Most of the *Pieter Faure* examples are, like the *Valdivia* specimens, covered with an Alcyonarian.

Fusus faurei n. sp.

Figs. 19(*h*), 20(*e*)

Aperture (incl. canal) 1⅓ times spire. Profile of whorls convex, slightly biangulate. Protoconch 2 (2½) whorls, diam. and alt. 2 mm., smooth (but all specimens more or less corroded). Postnatal whorls 6; axial ribs 11–12 on 1st whorl, increasing to *c.* 18–20 on last whorl (irregular and obscure on last half whorl), low, rounded not prominent except at the 2 peripheral lirae, slightly retractive below suture; crossed by 2 main peripheral costae from 1st whorl onwards, with finer lirae above and below, on last whorl 6–7 above and 3–4 below the peripheral costae, varying in strength, the lowest one (next the suture) the strongest, 2–3 between the 2 costae, 15–20 additional lirae on base, usually an intermediary between each pair. No parietal callus. Columella gently curved, no pleats, not rimate. Canal a little shorter than, and distinctly but not sharply marked off from rest of aperture, straight or very slightly reflexed at tip, open. Periostracum thin. 50 (protoconch and tip of canal broken) × 22 mm.; 33 × 15 mm.

Operculum oval, apex blunt, incurved, 9 × 5 mm. in 38 mm. shell.

Creamy-white, periostracum grey, operculum amber-brown.

Radula with at least 180 rows, central plate narrowed in front, tricuspid, lateral plate with 11 cusps (excl. inner denticle).

Living and dead: off Cape Point, 300–560 fathoms (S. Afr. Mus. A4581 (Type), A4582. P.F. coll.).

Fusus bonae-spei n. sp.

Fig. 20(*c*), (*f*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 183, pl. 32 (20), fig. 18 (*capensis*, non Dunker). Not the juv., p. 184, fig. 19 = *verruculatus*.

Aperture (incl. canal) a little longer than spire. Profile of whorls convex but weakly biangulate. Protoconch 2½ whorls, when not corroded diam. 2 mm., alt. 2·5–3 mm., smooth, junction with 1st postnatal whorl abrupt. Postnatal whorls 7; feeble axial ribs 8–9 on 1st whorl, increasing to 9–10, but not traceable beyond 4th whorl; growth-lines distinct; crossed by spiral lirae, on 1st whorl 3, the lower two stronger than the upper one, continued on following whorls, the two stronger ones forming the periphery, with weaker intermediaries producing a fine cancellate sculpture, 20–25 additional lirae on base also with intermediaries. No parietal callus, columella slightly curved,

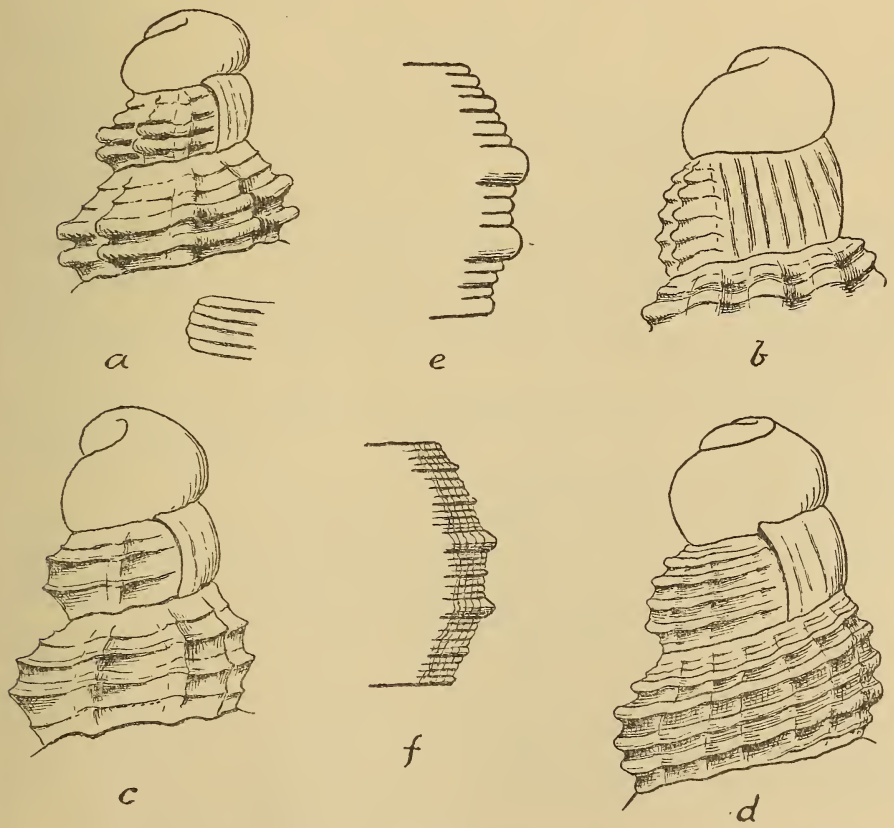

Fig. 20.

(*a*) *Fusus verruculatus* Lam., protoconch, with detail of one lira. (*b*) *F. colus* Linn. protoconch. (*c*) *F. bonae-spei* n. sp. protoconch. (*d*) *F. africanae* n. sp., protoconch. (*e*) *F. faurei* n. sp., profile. (*f*) *F. bonae-spei* n. sp., profile.

canal 1¼–1⅓ times, but not very sharply marked off from rest of aperture, straight or slightly curved and reflexed, narrow. Outer lip not plicate internally. Periostracum thin, fibrous-fimbriate. 102 × 34 mm.

Operculum oval, apex incurved, 20 × 12 mm. in 102 mm. shell, internal surface as in *Fasciolaria*.

Creamy-white or pale buff, periostracum yellowish-buff, operculum brown.

Dead: 34° 33′ S. 18° 2′ E., 318 metres (Thiele).

Living and dead: off Cape Point, 85–256 fathoms (S. Afr. Mus. A4622, A4628–32, Type A4632. P.F. coll.).

Remarks. I have not seen Dunker's description or figure, but it seems most improbable that Thiele's *capensis* is the same. Krauss gave the dimensions of Dunker's species as 10 × 5·2 lines.

Although there are eight specimens in S. Afr. Museum with their opercula, no animal has been preserved.

Fusus africanae n. sp.

Figs. 19(*k*), 20(*d*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 184, pl. 32 (20), fig. 20 ('*Fusus* n. sp.', *sine nom.*).

The *Valdivia* specimen from 35° 16′ S. 22° 26′ E., 155 metres, measured 22·5 × 9 mm. and consisted of a large protoconch and 3 whorls. The profile of the whorls is evenly convex, without the bicarinate periphery of juvenile *verruculatus* and *bonae-spei*. Thiele was therefore correct in regarding it as a distinct species. Unfortunately he did not state the number of ribs and spiral lirae; judging by his figure there might be 13 or 14 ribs and 4 or 5 lirae on the 2nd and 3rd whorls.

The *Pieter Faure* obtained two smaller specimens, 15 × 6·5 mm.; one in 1900 from off west coast of Cape Peninsula, 131–136 fathoms, and another in 1906 from Brown's Bank (approx. 36½° S. 21° E.), 80–100 fathoms (S. Afr. Mus. nos. A8826 and A8610 Type).

Aperture (incl. canal) a little longer than spire. Protoconch 2½ whorls, diam. 3, alt. 2·75–3 mm., smooth, with 2–3 feeble growth-lines (scarcely ribs) on outer lip. First postnatal whorl beginning abruptly, and not quite flush with outer lip of protoconch; 14 low feeble axial ribs on 1st and 15 on 2nd whorl (slightly irregular in A8826 owing to injury), 3rd whorl incomplete; crossed by 4 spiral lirae of nearly equal strength (the uppermost one slightly weaker) on 1st and 2nd whorls, a finer one between 1st lira and suture, and indications of a fine intermediary between each pair of main lirae (more distinct in A8826 than in A8610), also a lira below the 4th but partly obscured by suture of following whorl; intersections very slightly nodulose; on base of last whorl *c.* 10 main lirae, with finer intermediaries. Columella curved, no visible pleats, canal slightly curved, a little longer than rest of aperture.

Operculum oval, apex incurved, 3·5 × 2 mm.

The Fisheries Survey vessel *Africana* obtained (1948) a larger example 52 × 17 mm., from 34° 35′ S. 19° 14′ E., 66 metres (AFR. 864 E.).

Protoconch 2½ whorls, diam and alt. 3 mm., smooth, with 2–3 feeble lines of growth on outer lip. Postnatal whorls 5; 1st beginning abruptly and not quite flush with outer lip of protoconch; axial ribs on 1st whorl obscure, possibly 14, on 2nd whorl 15 (16) also feeble, on 3rd whorl 16 (17), on 4th 17 (18), thereafter evanescent; crossed by predominant spiral lirae, 5 on 1st whorl, the lower 3 strongest, a finer one between 1st lira and suture, and below the 5th another partly obscured by suture of following whorl; on 2nd and following whorls 6 lirae, the 3 lowest strongest on 2nd and 3rd whorls, the 4 lowest on 4th and 5th whorls, one fine intermediary between each pair of stronger lirae; on base of last whorl 12 (and some obscure ones on rostrum) additional lirae with fine intermediaries; lirae on later whorls distinctly flattened. A small dentiform parietal callus, no visible columella pleats.

Operculum oval, apex incurved, 9 × 6 mm.

Protoconch glistening white, shell greyish-white, operculum horn coloured.

A very thin periostracum obscured by a thin layer of sponge; and with numerous oval horny capsules (maj. diam. 0·5 mm.) glued firmly to the shell (not belonging to this species, or any other Fasciolariid as they are not stalked).

Radula with *c.* 190 rows, central plate tricuspid, lateral plate with 11 cusps (excl. the tiny inner denticle), the innermost 2 strong, the others alternately smaller and larger, the 10th cusp rather strong and the outermost one the smallest; the arrangement is not quite symmetrical on the two sides, nor on successive plates on the same side, particularly so on the left side; the right side as shown in fig. 19(*k*) seems to be the most usual arrangement.

Radula of the two juv. P.F. specimens with 105–110 rows, lateral plate with 5 unequal cusps.

Remarks. The *Africana* specimen is separately described to show the slight difference in detail of the spiral lirae; viewing it side by side with the other two there is no doubt they are conspecific; and there seems little doubt that they are the same as the *Valdivia* example.

The 25 mm. shell in bad condition figured by Thiele (loc. cit., fig. 19) from the same locality has a smaller protoconch and seems to be referable to *verruculatus*.

The four known examples are all from moderate depths on the southern and south-western slopes of the Agulhas Bank, and it is surprising that no others have been obtained. From the size of the protoconch one would suspect an adult at least as large as *verruculatus*.

The radulae of all three specimens are remarkable for the inequality of the cusps on the lateral plate, especially noticeable in the large *Africana* specimen, thus resembling the radula of *Peristernia* more than that typical of *Fusus*.

Fusus albinus A. Adams

1855. A. Adams. *Proc. Zool. Soc. Lond.*, p. 222.
1880. Sowerby. *Thes. Conch.*, p. 80, pl. 7 (411), fig. 72.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 9, pl. 2, fig. 9 (*appressus*).
1903. Thiele. ibid., p. 169, pl. 9 (4), fig. 61 (radula) (*appressus*).
1912. Dautzenberg. *Ann. Inst. ocean.*, V, pt. 3, p. 28.

Adams described 'a large white solid species with moderately long beak, and with longitudinal rounded rib-like plicae which are obsolete at the sutures' from Ichaboe Island, north of Lüderitzbucht.

Von Martens compared his species, 101 × 40 mm. from Great Fish Bay (Angola), 16 fathoms, with *albinus*, but concluded that the two were distinct.

Dautzenberg recorded *albinus* from Mossamedes, 15–20 metres, and Praya Amelia, 15–35 metres, but made no mention of *appressus*.

? *Fasciolaria holcophorus* n. sp.

Fig. 21

Fusiform, aperture subequal to spire. Profile of whorls convex, without shoulder. Protoconch 1½ whorls, diam 0·6, alt. 0·5 mm., smooth, with 4 or 5 faint axial ribs on last half whorl, junction with 1st postnatal whorl indistinct. Postnatal whorls 5; axial ribs 10–11 on 1st whorl, 8 on 2nd, 7 on each of the 3rd, 4th and 5th whorls, from suture to suture and strong on early whorls, but from later part of 4th whorl becoming feeble and causing mere undulations on the periphery of 5th whorl, obsolete on base; crossed by spiral striae, 4 on 1st whorl, 7 on 2nd, 8 on 3rd, 9 on 4th and 10 on 5th, about 16 additional on base, those on rostrum almost parallel with the canal, all striae regularly spaced except 2 or 3 fine intermediaries on base. Columella gently curved, with 3 pleats, the lowest one feeble. Canal straight (tip broken). Periostracum thin, smooth. 11 × 4 mm.

Fig. 21. *Fasciolaria* ? *holcophorus* n. sp.

White, periostracum pale buff.

Off Cape St. Blaize, 125 fathoms, 1 dead (S. Afr. Mus. no. A8819. P.F. coll.).

Remarks. In the absence of the radula the generic position of this pretty little shell is quite uncertain. There is a somewhat fanciful resemblance to *Ptychatractus*, which Thiele (1929) removed from the *Fasciolariidae* to the *Vasidae*.

Fam. *NASSIDAE*

Gen. Nassa Lam.

1799. Lamarck. *Mem. Soc. H. N. Paris*, p. 71 (non *Nassa* Bolten, 1798).
1806. Duméril. *Zool. Analyt.*, p. 166 (*Nassarius*).

1916. Iredale. *Proc. Mal. Soc.*, xii, p. 82 (*Nassarius*).
1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 313 (*Nassarius*).
1929. Thiele. *Handbuch*, i, p. 322 (incl. *Desmoulea* [*sic*]).
1931. Lebour. *J. Mar. Biol. Assoc.*, xvii, p. 797 (eggs and larva).
1936. Peile. *Proc. Mal. Soc.*, xxii, p. 139 (radula).
1939. id. ibid., xxiii, p. 276 (radula).

Remarks. Neither *Nassarius* Duméril 1806 nor *Nassaria* Link 1807 (*Buccinidae*) are to be rejected on account of the similarity of their termination (Rules Zool. Nomencl. Art. 36. Rec.), though Iredale thought otherwise; but as they are very liable to confusion, no apology is made for reverting to *Nassa* Lam; Thiele accepted it, several years after Iredale's proposed alteration; and everyone knows the distinctive facies of a 'Nassa'. As regards subgenera, until some agreement is reached on their definition, they are better ignored, at least so far as South African species are concerned. These are all typically 'Nassa', with the one exception of *kraussiana*, the radula of which is also distinctive.

South African 'beach-conchology' has run rampant in this genus; and when once a species has acquired synonyms it seems to attract more synonyms, e.g. *capensis* and *kochiana* (cf. Tomlin). Most of Turton's 'n. spp.' will probably prove to be synonyms, but without actual examination of his material one can only suggest possible or likely synonymy. He took no notice of Tomlin's 1928 paper.

Nassa analogica Sow.

Fig. 22(*a*)

1853. A. Adams. *Proc. Zool. Soc. Lond.* (for 1851), p. 113 (*trifasciata*, non Gmelin).
1903 (8th July). Sowerby. *Mar. Invest. S. Afr.*, ii, p. 219, pl. 4, fig. 3.
1903. id. ibid., p. 228, pl. 4, fig. 2 (*trifasciata* Adams).
1903 (18th Dec.). Von Martens. *D. Tiefsee Exp.*, vii, p. 27, pl. 3, fig. 18 (*circumtexta*).
1903. Thiele. ibid., p. 167, pl. 9 (4), fig. 52 (radula) (*circumtexta*).
1906. Smith. *Ann. Natal Mus.*, i, p. 36 (*circumtexta* and *analogica*).
1910. Dautzenberg. *Act. Soc. Linn. Bordeaux*, p. 55 (*gallandiana* Fischer).
1912. id. *Ann. Inst. ocean.*, vol. V, fasc. 3, p. 33 (*trifasciata* Adams).
1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, p. 6 (*trifasciata* Adams).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 182 (*circumtexta*).
1928. Tomlin. loc. cit., p. 316 (*circumtexta*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 59 (*trifasciata* Adams).

Radula. Thiele gave the number of cusps on the central plate of a radula 4·5 mm. long as 8. In S. Afr. Mus. specimens of radulae 3·5–4·5 mm. long, there are 65–75 rows, central plate with 11–13 (rarely 10) cusps, slightly variable in size *inter se*, with a minute one externally on both sides, no intermediate plate, outer cusp of the lateral plate with a slight bulge (scarcely a denticle) on inner margin, but sometimes obscure, inner cusp rather slender. No difference in the radulae of the '*trifasciata*' and *analogica* forms.

The 1st whorl always, and usually also the 2nd whorl, appear to have only spiral lirae; but axial ribs may be developed on the 3rd and 4th whorls, or on the 4th and 5th, or on the 5th and 6th, or on all these whorls (3–6). The number of ribs is 14–15 on 3rd whorl, *c.* 20 on 5th, and 22–24 on 6th.

FIG. 22.

Central and lateral radula plates of *Nassa* (*a*) *analogica* Sow.; (*b*) *kochiana* (Dnkr.); (*c*) *speciosa* A. Adams; (*d*) *desmoulioides* Sow.; (*e*) *babylonica* Watson; (*f*) *eusulcata* Sow.; (*g*) *gemmulata* (Lam.); (*h*) *bicallosa* Smith; (*i*) *arcularia* Linn.; (*j*) *coronata* Brug.; (*k*) *kraussiana* (Dnkr.); (*l*) *Demoulia abbreviata* (Gmelin).

The ribs are distinctly oblique (retractive), and when present on the 6th whorl they cross the base as far as the columella glaze.

Periostracum thin, minutely fimbriate in some well-preserved specimens, pale grey or buff.

Operculum triangularly oval, margins entire.

Dead: west coast Cape Peninsula, Port Alfred; also Great Fish Bay (Angola) (Thiele).

Living (and dead): 'trifasciata' form: from off East London to False Bay and off Cape Point, 26–58 fathoms (von Martens, Sowerby, and S. Afr. Mus. P.F. coll.); '*analogica*' form: from False Bay around Cape Point to the Saldanha Bay area, 22–80 fathoms (S. Afr. Mus. P.F. coll.); St. Helena Bay, 27 metres (per U.C.T.). 26° 33′ S 15° E., 55 metres (s.s. *Africana*, per U.C.T.).

Remarks. The extreme forms: a fully plicate '*trifasciata*' and a spirally lirate *analogica*, are very different in appearance. Sowerby said (1903, p. 220) the two forms 'when separated' showed very little variation; the difficulty is to separate them!

In *analogica* the spiral lirae are always flat-topped, but their width varies according as they are separated by narrow striae or flat-bottomed grooves, which latter may sometimes be almost as wide as the lirae. The width of the spiral lirae appears to be less variable in the plicate form.

The *Pieter Faure* material in the S. Afr. Museum shows that the more or less plicate form is found on the south coast as far west as False Bay and Cape Point, but not on the west coast (a beach-worn specimen from Table Bay is an exception); the lirate form is more characteristic of the west coast, but occurs throughout the south coast area.

Both von Martens and Smith regard Adams's locality (Vigo Bay, Spain) as erroneous.

Dautzenberg (1912) regards *gallandiana* Fischer 1862 as synonymous with *triafasciata* Adams, with distribution: mouth of the Congo River, 25 metres, and (loc. cit. 1910) Lagos and Senegal. The identity of the Angolan, and especially the west African examples, with South African examples requires investigation.

Nassa pyramidalis (A. Adams)

1853. A. Adams. *Proc. Zool. Soc. Lond.* (for 1851), p. 113 (*Desmoulea p.*).
1886. Sowerby. *J. Conch.*, v, p. 4 (*Desmoulea p.*).
1900. id. *Proc. Mal. Soc.*, iv, p. 2, pl. 1, fig. 5 (*filmerae*).
1928. Tomlin. loc. cit., p. 318 (*filmerae*) and p. 325 (*pyramidalis*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 59, pl. 14, nos. 435, 436, 437 (*pyramidalis*, and vars. *affinis* and *punctilineata*); and p. 59 (*filmerae*).
1932. id. *J. Conch.*, xix, p. 370 (*rufanensis* nom. nov. for *affinis* preocc. Sow. 1832).

Pyramidal. Protoconch 3 whorls, diam. and alt. 0·75–0·8 mm., smooth, glossy. Postnatal whorls 7; axial ribs 13–14 on 1st, increasing to 14–15, from suture to suture, straight or slightly oblique (protractive), more strongly marked on early whorls, and usually evanescent on last half of 7th whorl; crossed by

spiral lirae, 4 on 1st whorl, 5 on 2nd, 6 on 3rd and increasing to 10–11 on last whorl, 12–14 additional lirae on base and 7–8 on rostrum. On later whorls the lirae become flattened and broader than the intervening striae, and the surface of the whorls is better described as being smooth with impressed spiral striae; a very characteristic sculpture. Internal parietal callus nodular, columella smooth, anteriorly subcarinate, columella glaze not extensive, thin. Outer lip internally plicate, and end plica posteriorly and anteriorly dentiform. 22 (protoconch and first 2 whorls missing) × 13 mm.

Operculum and radula?

Cream with orange-brown irregular marks, more or less connected to form a sutural band, or with a series of dots along some of the lirae, aperture and columella more or less brownish, apex in worn specimens sometimes violaceous.

Port Elizabeth, Port Alfred, Pondoland. Mouth of Gouritz River, and Jeffreys Bay (S. Afr. Mus.). Algoa Bay, 10 fathoms, off Cape St. Blaize, 28 fathoms, off Cove Rock (East London area), 80–130 fathoms, off Umhloti River (Natal), 40 fathoms (S. Afr. Mus. P.F. coll.). 30° 47′ S. 30° 29′ E. 24 fathoms (U.C.T.).

Remarks. Only dead specimens known, though one of the Cape St. Blaize specimens, and the 6 juveniles from Umhloti, obtained by the *Pieter Faure*, were quite fresh. U.C.T. obtained one dead shell in Algoa Bay, and one dead but fresh specimen off Scottburgh, Natal.

There are 3 cotypes of *filmerae* from Pondoland (don. Dr. H. Becker) in S. Afr. Museum; it seems strange that Tomlin did not definitely unite this with *pyramidalis*.

Nassa babylonica Watson

Figs. 22(*e*), 23(*e*)

1882. Watson. *J. Linn. Soc. Lond.*, xvi, p. 366.
1886. id. *Challenger Rep.*, xv, p. 185, pl. xi, fig. 8 (with protoconch and operculum).
1899. Smith. *Ann. Mag. Nat. Hist.* (7), iv, p. 243 (*diluta*).
1901. *Illustr. Zool. Investigator. Moll.*, pl. xi, figs. 3, 3*a* (*diluta*).
1901. Melvill & Standen. *Proc. Zool. Soc. Lond.*, ii, p. 409.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 100, pl. 3, figs. 7, 8.
1903. Thiele. ibid., p. 167, pl. 9 (4), fig. 53 (radula).
1925. id. ibid., xvii, p. 183.
1928. Tomlin. loc. cit., p. 314.

Turreted, with square shoulders. Protoconch $3\frac{1}{4}$–$3\frac{1}{2}$ whorls, diam. and alt. 1 mm., smooth, the 3rd whorl carinate below middle of whorl, the carina descending into the suture on last quarter whorl. Postnatal whorls 5; axial ribs 11–12 on 1st whorl, increasing to 14–15 on last whorl, sharply tubercular at top, slightly indented immediately below; spiral lirae feeble, 3–4 traceable on lower part of 4th and 5th whorl, with 3–4 stronger additional ones on base. Outer lip feebly denticulate within. 0·45 × 0·23 in. (Watson); 10 × 5 mm. (S. Afr. Mus.); 12 × 7 mm. (Smith: *diluta*).

Operculum triangularly oval (more triangular than in Watson's figure), not quite twice as long as broad, margins entire.

Radula with 60–65 rows, central plate strongly concave in front, with 8–9 (10) cusps, slightly varying in size *inter se*, the middle one usually the largest, the outermost one or two on either side minute, lateral plate with rather short cusps, the inner one stout, no intermediate plate.

Off Cape Natal (Durban), 400 fathoms, 24 specimens, most of them dead (S. Afr. Mus. P.F. coll.).

Distribution. East Africa. 1,134–1,644 metres (von Martens); Gulf of Oman and Karachi, 37–80 fathoms (Melvill and Standen); off Ceylon, 597 and 753 fathoms (Smith); Philippine Islands, 375 fathoms (Watson).

Remarks. Von Martens illustrated plump and slender forms. In the present lot there are two broken specimens with 4 whorls measuring 10 × 5·5–5·75 mm.

Smith's *diluta* has one or two fewer ribs, but can scarcely be regarded as distinct.

Only one specimen was available for Tomlin's inspection; the other examples have since been found in a bottom sample from the same locality.

For comparison of protoconch with that of *bicallosa*, see latter p. 108.

Nassa capensis (Dnkr.)

Fig. 23(*a*)

1880. Von Martens. *Mauritius & Seychellen*, p. 243.
1928. Tomlin. loc. cit., p. 315 (references and synonymy).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 55, pl. 12, no. 412 (*kraussi*).
1932. id. ibid., p. 58, pl. 13, no. 425 (*ordinaria*).

Protoconch 2½ whorls, diam 0·6, alt. 0·75 mm., smooth. Postnatal whorls 7; axial ribs (9) 10 on 1st whorl, 10–11 on 2nd, 11–12 on 3rd, 12–13 (14) on last whorl, suture to suture, oblique, protractive, evanescent on base; crossed by spiral lirae 4 (5) on 2nd–4th whorls, obscure on 1st and usually not continued on to 5th, always obsolete on 6th and 7th leaving the ribs and intervals perfectly smooth; 2 rather broad flat spiral lirae on base anteriorly and 6 striae on rostrum. Internal parietal callus cariniform, columella smooth, carinate at anterior end, columella glaze not extensive, thin. Outer lip with varix in adult, internally plicate (but often feebly). 16·5 × 6 mm.

Operculum and radula?

Cream or buff, speckled or dappled, with a more or less marked brown band on lower part of base, bordered above by a disconnected series of dashes (one in each interval between the ribs) which appears just above suture in preceding whorls; in juveniles protoconch and 1st whorl brown, following whorls glistening white; sometimes pure white (but ? faded), or unicolorous yellowish, amber, ochraceous or brown (*serotina*); anterior canal often rusty brown.

False Bay to East London and Natal (Tomlin, S. Afr. Mus.); also (small form) Tongaat (Natal).

Distribution. Mauritius and Réunion (von Martens).

Remarks. Plump and slender forms occur, e.g.: 10 × 5 mm. and 10 × 4 mm. The ribs on successive whorls are more or less in an axial line, sometimes very distinctly so (resembling a *Scalaria*).

Protoconchs and juveniles were collected at Still Bay by the late Dr. Muir.

It is remarkable that no living specimens have been collected.

The Mauritius and Réunion records should be checked, also Bisacchi's (1930) record of *pulchella* from Suez.

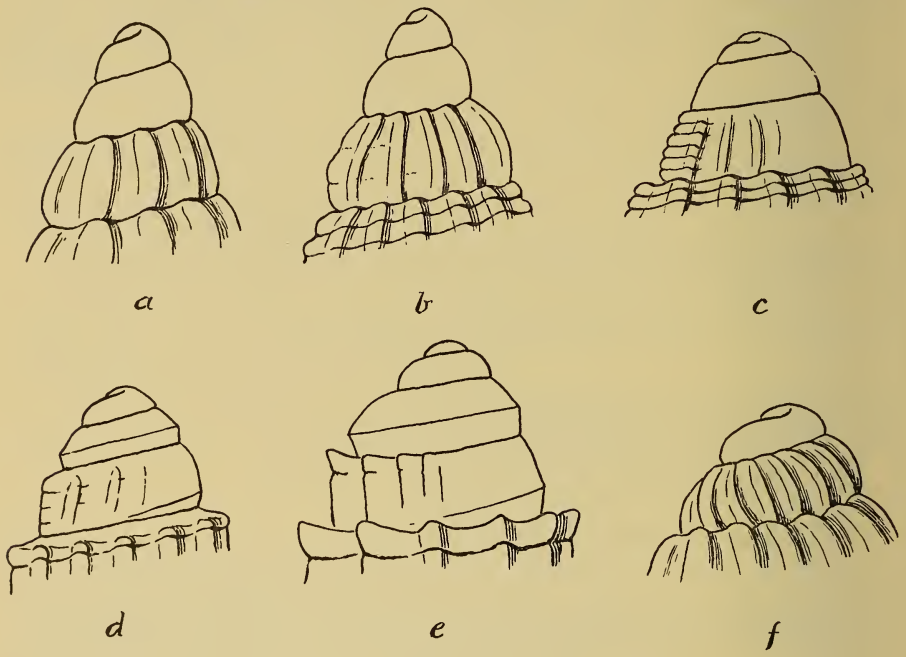

Fig. 23.

Protoconchs of *Nassa* (*a*) *capensis* (Dnkr.); (*b*) *kochiana* (Dnkr.); (*c*) *desmoulioides* Sow.; (*d*) *bicallosa* Smith; (*e*) *babylonica* Watson; (*f*) *kraussiana* (Dnkr.).

Nassa kochiana (Dnkr.)

Figs. 22(*b*), 23(*b*)

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 28 (*crawfordi*).
1925. Thiele. ibid., xvii, p. 182 (*limata* Chemn.).
1928. Tomlin. loc. cit., p. 319 (references and synonymy) and p. 327.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 56, pl. 13, no. 417 (*eucosmia*), and p. 57, pl. 13, no. 419 (*carinata*).

Protoconch 2½ whorls, diam. 0·6, alt. 0·75 mm., smooth. Postnatal whorls, 7; axial ribs 12–13 on 1st whorl, 13–14 on 2nd, 14–15 on 3rd, increasing to 15 or 16 to 18 on last whorl, from suture to suture, slightly curved and

protractive, continued across base; crossed by spiral lirae 4 on 1st whorl, 5 (6) on 2nd, 6 (7) on 3rd, increasing to 13–14 on last whorl, 2 or 3 of the lirae on early whorls and 4 or 5 on the later whorls near the suture are fine and narrower than the others; 5 (6) additional lirae on base, sometimes with finer intermediaries, 6 striae on rostrum. Internal parietal callus cariniform, columella smooth but sometimes feebly granulate, carinate at anterior end, columellar glaze not extensive, thin. Outer lip with varix in adult, internally plicate. 14 × 6 mm.

Operculum oval, margins entire.

Cream or buff with faint dappling or spiral lines, chiefly on base, with a series of brown spots forming a broken narrow spiral band just below periphery from upper end of aperture on last whorl, on earlier whorls just above suture, sometimes with a white band above the dark band (*spurca* and *poecilostoma*); or unicolorous yellowish, ochraceous, brown, or pinkish (*coccinea*); in juveniles protoconch and early whorls glassy white with indications (on 2nd and 3rd whorl) of dappling and the brown spiral line; anterior canal often rusty brown; or with 9–10 pale brown narrow spiral bands on last whorl (incl. base), the ends of which appear on the outer lip varix as double lines (*crawfordi*).

Radula with *c.* 60 rows, central plate strongly concave in front, with 9 cusps and a minute one externally on either side, inner cusp of lateral plate moderately stout, no intermediate plate.

Fossil: raised beach Algoa Bay.

False Bay to Port Alfred. The only record from the west coast (Tryon: Table Bay) is scarcely acceptable.

Living: False Bay, 24 metres (U.C.T.).

Remarks. Thiele (1925) disagreed with von Martens's (1903) identification of shells from St. Francis Bay as *crawfordi*, preferring to identify them with *limata* Chemn. (Mediterranean, Madeira, Canaries, Cape Verde Is., and West Africa); von Martens is more likely to have been correct.

Dautzenberg (1912, *Ann. Inst. ocean.*, vol. 5, fasc. 3, p. 31) recorded *poecilostoma* Smith from Mossamedes, littoral and 15–20 metres. I think these specimens should be re-examined.

The obliquity of the ribs varies, and may vary from whorl to whorl on the same shell. Also there are plump and slender forms.

Comparison of *kochiana* with European *incrassata* at once shows the differences: in the latter the axial ribs are retractive, the number of spiral lirae on the 6th whorl is only 6, the intersections are more nodulose, the profile is undulate (notched in *kochiana*), and there are no fine lirae below the suture, or at most only one and that one is only very slightly narrower than the following lirae.

Nassa muiri n. sp.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 58, pl. 13, no. 428 (*microstoma*, non Pease) and no. 429 (*ambigua*, non Mont.).

Protoconch 2½ whorls, diam. 1–1·25, alt. 0·75–0·8 mm., smooth. Postnatal whorls 4, profile rather strongly convex; axial ribs 15 on 1st whorl, 18–19 on 2nd, 21–23 on 3rd and 4th, but often obscure on 4th and only *c.* 17–18 countable, sometimes only 17 on 2nd and 3rd, and 18 on 4th whorl, straight (or nearly so) and retractive; crossed by spiral lirae 6 on 1st whorl, 7 on 2nd, 8 on 3rd, 9–10 on 4th, intersections here and there irregularly nodulose, 7–8 additional lirae on base, 4–5 striae on rostrum. Columella smooth, angulate anteriorly, columellar glaze not extensive; parietal callus feeble; outer lip with varix, internally more or less plicate. 10 × 6·5 mm. (Turton gave '*c.* 16 mm.' for *microstoma*, but the line alongside the figure is only 11 mm.)

Operculum oval, margins entire.

Pale buff, with irregular orange-brown marks giving an impression of more or less distinct flames, chiefly around upper half of whorl, which may thus be nearly uniformly brown; two or three marks on outer lip varix; anterior canal orange-brown.

Radula with 60–65 rows, central plate strongly concave in front, 8–9 (10) cusps, with a small or minute one externally on either side, inner cusp of lateral plate moderately stout, no intermediate plate.

Port Alfred (Turton, also S. Afr. Mus. one example from Turton labelled '*quantula*'); a series from possibly the same locality (S. Afr. Mus.); Still Bay, juvenile (protoconch plus 2 whorls), very fresh (S. Afr. Mus. Muir coll.); from stomach of seal caught in False Bay, seven examples (S. Afr. Mus.); Algoa Bay, 52 fathoms, and off East London, 32 fathoms (S. Afr. Mus. P.F. coll.); False Bay (34° 18′ S. 18° 29′ E.), 51 metres (U.C.T.); 34° 15′ S. 25° 5′ E. 6 fathoms, and 33° S. 28° 11′ E. (off East London), 31 fathoms (U.C.T.).

Remarks. Turton's photographic figures of what he recorded as possibly *microstoma* and *ambigua*, certainly represent this species. Mr. Salisbury informs me that it is not the West Indian *ambigua*.

The straight and slightly retractive axial ribs distinguish it from *kochiana*.

Named after the late Dr. John Muir, of Riversdale.

I am diffident about introducing another species so close to *plebeja* Thiele, but the shells can be distinguished at a glance by the more numerous spiral lirae in *muiri*. The sulci are consequently narrower than the lirae, which produces a lirate sculpture; whereas in *plebeja* the lirae and sulci are subequal, producing a more cancellate sculpture.

Nassa plebeja Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 182, pl. 32 (20), fig. 9.

Protoconch 2½ whorls, diam. 0·75, alt. 0·6 mm., smooth. Postnatal whorls 4½; axial ribs 14 on 1st whorl, increasing to 15 (16 incl. varix) on last whorl, straight or slightly curved, slightly retractive, obsolete on base of body whorl; crossed by spiral lirae 4 on 1st-3rd whorls, 5 on 4th, on 3rd and 4th

whorls an additional finer lira appears between the suture and the uppermost lira, 4 additional rather sharp lirae on base and 5–6 on rostrum; intersections with ribs slightly nodulose. Columella angulate anteriorly, columellar glaze narrow; parietal callus feeble (distinct in Thiele's figure); outer lip with varix, plicate within. 7 × 4 mm. Thiele: 6·25 × 3·5 mm.

Uniform greyish. Brown above and below the periphery, anterior canal darker (Thiele).

St. Francis Bay, 80 metres, and Algoa Bay (Thiele). Algoa Bay 51 fathoms, two dead (S. Afr. Mus. P.F. coll.). False Bay (U.C.T.).

Distribution. Great Fish Bay, Angola (Thiele).

Remarks. The single U.C.T. specimen and the two P.F. specimens appear to agree with *plebeja*, assuming that Thiele's figure is correct; his description does not give the number of axial ribs or spiral lirae.

The identity of the Angolan specimens is provisionally accepted. cf. Odhner's record of *ambigua* Mont. from Port Alexander (1923. *Goteb. K. Vet. Handl.*, xxvi, 7, p. 14).

Nassa bicallosa Smith

Figs. 22(*h*), 23(*d*)

1876. Smith. *J. Linn. Soc. Lond.*, xii, p. 543, pl. 30, fig. 1.
1928. Tomlin. loc. cit., p. 313 (*algida*, non Rve., part: S. Afr. Mus. no. A6398).
1928. id. ibid., p. 314.

Protoconch 3½ whorls, diam. 1, alt. 0·75–0·8 mm., smooth, a faint peripheral keel on last whorl and half. Postnatal whorls 6 (7 in two specimens); profile of whorls straight or nearly so, squarely shouldered at top; axial ribs 13–14 on early whorls, increasing to 15–16 or 17 on later whorls, where some of them are often more or less duplicated, from suture to suture and distinctly oblique (retractive) from 1st to 5th whorls, on later part of 5th and on 6th becoming evanescent except as knobs at top of whorl, sometimes strongly, sometimes feebly developed; one spiral stria marking off the coronal knobs on all whorls, but evanescent on last whorl, 6–7 striae on lower part of base and 3–4 on rostrum. External parietal callus opposing tooth on outer lip nodular (in adult), labral sinus deep, internal callus dentiform or subcarinate; columella anteriorly carinate and denticulate, glaze not extending over base, its edge free. Outer lip internally plicate. 26 × 15 mm. (6 whorls), 27 × 15 mm. (7 whorls).

Operculum triangularly ovate, serrate on both margins (when not corroded), 7–8 × 5 mm.

Living examples from 24 fathoms varying from buff, slightly stained with orange, to reddish-brown, partly coated with some black substance, aperture brownish within, outer lip white, operculum amber or dark brown.

Specimens from 14 fathoms varying from reddish or chestnut brown to almost black, most specimens more or less corroded and covered with some

(? algal) substance, chiefly on the upper side while the lower side remains polished.

Radula with *c.* 75 rows, central plate with 16 cusps, outermost one or two on either side minute, intermediate plate oval, lateral plate without denticles between the 2 cusps.

Cape Natal (Durban) (Smith). Off Tongaat, 36 fathoms, one juv. dead, and off Umhlanga, 22-26 fathoms one juv. dead; off Umkomaas, 40 fathoms, 3 protoconchs (S. Afr. Mus. P.F. coll.).

Living: off Tugela River, 12–14 and 24 fathoms (Tomlin, S. Afr. Mus. P.F. coll.).

Remarks. Tomlin, by a slip, referred some of the specimens (S. Afr. Mus. no. A6398) dredged in 12–14 fathoms to '*algida*'; they are clearly the same as those dredged in 24 fathoms (A6399).

The specimens from the deeper water are not corroded and are quite clean except for traces of foreign matter on the upper whorls; they are also more strongly coronate than most of the shallower water examples. The operculum of the latter is also more or less corroded to an irregular oval shape.

The double columella callus may serve to distinguish this species from *glans-suturalis*, but is found in other species e.g. *coronata*.

The three very juvenile examples, consisting of protoconch and first two postnatal whorls, one of them quite fresh and translucent, show that the species is living as far south as Umkomaas.

Apart from the 1st and 2nd postnatal whorls, the protoconch would be indistinguishable from that of *babylonica*; the straight-sided early whorls are very similar in the two species, but *bicallosa* has one or two more ribs, and the tops of the ribs are not so mucronate as in *babylonica*. The profile of the later whorls becomes gradually oblique in *bicallosa*, producing a pyramidal shell, whereas in *babylonica* it remains essentially vertical, and the adult shell is turreted.

Nassa glans (Linn.)

1758. Linne. *Syst. Nat.*, 10th ed., p. 737, sp. 394 (*Buccinum g.*).
1822. Lamarck. *Anim. sans. Vert.*, vii, p. 269 (*Buccinum suturale*).
1859. Chenu. *Man. Conch.*, i, fig. 771.
1880. Von Martens. *Mauritius & Seychellen*, p. 242 (*suturalis*).
1886. Watson. *Challenger Rep.*, xv, p. 179 (references).
? 1901. Smith. *J. Conch.*, x, p. 111, pl. 1, fig. 17 (*algida*, non Rve.).
1928. Tomlin. loc. cit., p. 313 (*algida*, non Rve., part: S. Afr. Mus. no. 14039).
1928. id. ibid., p. 325 (*suturalis*).
1952. Satyamurti. *Bull. Madras Govt. Mus.*, n.s. I, ii, 6, p. 184, pl. 17, figs. 7 *a*, *b* (*suturalis*).
1956. Day & Morgans. *Ann. Natal Mus.*, xiii, p. 306 (listed, as *algidus*, non Rve.).

Protoconch 1½ (2) whorls, smooth. Postnatal whorls 6; axial ribs *c.* 18–22 on early whorls, from suture to suture, but evanescent on 6th whorl except as a series of coronal nodules; crossed by 3 spiral striae dividing the ribs into 4 approximately equal-sized nodules, evanescent as impressed striae on 5th

whorl, but often indicated by thin coloured lines, a 4th stria partly visible in the suture; 4 additional lines on base, the lower 2 of which are again impressed striae, 6–8 striae on rostrum. Internal parietal callus strongly cariniform, columella carinate at anterior end, glaze not extensive, edge free on rostrum. Outer lip thin, with strong tooth posteriorly opposite the parietal callus, forming a deep sinus, internally non-plicate. 25 × 13 mm. (S. Afr. Mus.); 31 × 18 mm. (Smith).

Operculum triangularly ovate, serrate on both margins, 3 × 2·5 mm. in aperture 10 mm. in shell 20 mm. long.

Yellowish with diffuse orange blotches or flames, early whorls pinkish, protoconch crimson, the spiral striae and lines orange-brown (dead specimens).

Animal pale, spotted with black on siphon and proboscis, tentacles pale.

Radula with *c.* 70 rows, central plate with 10 cusps, intermediate plate oval, lateral plate without denticles between the cusps.

Durban (Smith, Tomlin, S. Afr. Mus.).

Distribution. Zanzibar (S. Afr. Mus.), Mauritius, Ile de France, Indo-Pacific.

Remarks. N. suturalis is regarded as a small variety of *glans* (Watson, loc. cit.).

One of the shells described above was identified many years ago by J. H. Ponsonby, who doubted its South African provenance; later Tomlin confirmed the identity of this shell. Tomlin also identified 4 shells from Durban (S. Afr. Mus. no. 14039) as *algida* Rve. I cannot agree because the sculpture of the early whorls is the same as in the shell labelled *suturalis*, and the coloration is similar except that the orange-brown spiral lines are faded or worn away. I suggest also that Smith's identification was erroneous, and that the Australian *algida* be deleted from the South African fauna-list.

S. Afr. Museum has 2 examples of *glans* from the Philippines (ex Ross-Frames coll.): 7 whorls 44 × 23 mm., and 6 whorls 39 × 21 mm. Also 2 from Zanzibar (E. L. Layard, H.M.S. *Castor*, coll. 1856); 6 whorls 30 × 16 mm. and 5 whorls 21 × 11 mm. In these the 4th spiral line is visible throughout, nowhere covered by the suture; otherwise there is no difference, except the large examples are feebly plicate within the aperture.

Nassa coronata Brug.

Fig. 22(*j*)

1789. Bruguière. *Encycl. Meth. Vers*, 1, p. 276 (*Buccinum c.*).
1880. Von Martens. *Mauritius & Seychellen*, p. 242.
1928. Tomlin. loc. cit., pp. 317 and 327.

Protoconch 1½ whorls, smooth. Postnatal whorls 6; axial ribs 20–21 on 1st whorl, 22–23 on 2nd, 23–24 on 3rd, then decreasing to 18 on 4th, 10–12 on 5th and 6th whorls, suture to suture and straight or very slightly oblique (retractive) on 1st to 4th whorls, on 5th and 6th evanescent except as rounded

nodules forming a coronal shoulder; crossed by 3 spiral striae, one above and 2 below, the 2nd and 3rd closer together than the 1st and 2nd, demarcating 3 series of nodules, rounded in the uppermost series, axially elongate oblongs in the middle series and squarish areas in the third series; spirals continued on to 5th whorl but thereafter obsolete; 3 striae on lower part of base, 3–4 on rostrum. External parietal callus nodular, internal callus dentiform or subcarinate, labral sinus deep; columella subcarinate anteriorly and with 2–3 feeble plicae, glaze extensive, thickened in adult. Outer lip internally plicate. 32 × 20 mm.

Operculum subtriangular, 5–8 serrations on both margins, 6 × 6 mm. in 28 mm. shell.

Grey or bluish-grey, with cream coloured coronal knobs and a spiral band in middle of whorl, a narrower band lower down on base; outer lip externally and internally, and columella glaze white, aperture within brownish with the external pale bands showing through.

Radula with 65–75 rows, central plate with 10–12 cusps, intermediate plate piriform, lateral plate without denticles between the 2 cusps.

Fossil: raised beach, 375 ft. alt., Durban-Umgeni (Geol. Surv.).

Natal (Krauss, Tomlin, S. Afr. Mus.).

Living: Delagoa Bay (U.W.); Inhambane (U.C.T.).

Distribution. Mauritius, Madagascar, Aden, Indo-Pacific.

Nassa margaritifer (Dnkr.)

1928. Tomlin. loc. cit., p. 321.

Protoconch 1½ (2) whorls, smooth. Postnatal whorls 7; axial aribs 17–18 on 1st whorl, increasing to 24–26 on last, from suture to suture, straight, slightly oblique (retractive); crossed by one open groove on 1st whorl, 2 on 2nd and 3rd, and 3 on 4th–6th whorls, with a feebler 4th groove on later part of 6th and on 7th whorl, dividing the ribs into 3 series of rounded nodules, 4 series on 6th and 7th whorls; the uppermost groove below the subsutural nodules conspicuously wider than the other grooves; ribs on base extending to columella glaze and divided by 7 grooves into nodules. External parietal callus bulbous but not prominent, internal callus strongly cariniform, columella nodulose, carinate anteriorly, glaze not extensive but rather thick, edge on rostrum free. Outer lip feebly toothed posteriorly, internally plicate, externally thickened, more or less varicoid. 27 × 14 mm.

Operculum triangularly oval, margins undulate (probably serrate when fresh), 7 × 4 mm. in 26 mm. shell.

White with greyish shading and slaty-grey or purplish-brown irregular blotches and markings, a more or less continuous band of same colour around middle of last whorl (concealed by suture in earlier whorls), and another less well-marked below suture, columella and outer lip white, aperture within with

1–3 (usually 3) purplish bands, the one corresponding with the external peripheral band always present.

Dead: Durban (Smith); Bartholomew Diaz, Bazarute Islands, Portuguese East Africa (S. Afr. Mus. coll. Ross-Frames).

Distribution. Red Sea, Ceylon, Indo-Pacific.

Remarks. The Ross-Frames specimens were probably taken alive, though none of them now possess opercula.

A worn specimen in S. Afr. Mus. (no. 2623) registered as from Durban, was identified by Tomlin as the European *reticulata* Linn. 'doubtless from ballast'. It has a sutural and a peripheral dark band, and is so similar to *margaritifer* that the following differences between the two species may be given in case more 'ballast' specimens come to hand.

In fresh *reticulatus* (British specimens) there are only 12 axial ribs on 1st whorl, increasing to 20 on 7th; on last whorl there are 5 spiral sulci dividing each rib into 5 nodules, 7 additional sulci on base; the uppermost sulcus is an open groove (as in *margaritifer*) but the 1st nodule below the suture is double; a small nodule separated by a narrow impressed line from the larger (main) nodule; all the nodules are flat above, sloping below, so that the profile of the whorl is stepped or feebly serrate (in *margaritifer* it is only undulate). No external parietal callus and internal callus very feeble, columella nodulose only at anterior end, glaze more extensive. All these features are traceable in the 'ballast' specimen and confirm Tomlin's identification.

Braga (1952) has recorded *albescens* Dnkr. from Mozambique, and Thiele (1925) described *incognita* from Dar-es-Salaam, both of which might usefully be compared with the present species.

Nassa fenestrata Marrat

1848. Krauss. *Südafr. Moll.*, p. 122 (*Buccinum marginulatum*, non Lam.).
1877. Marrat. *New Forms of Nassa*, p. 10.
1928. Tomlin. loc. cit., p. 317, also p. 321 (*marginulatus*).
1931. id. *J. Conch.*, xix, p. 107.

Protoconch 1½ (2) whorls, smooth. Postnatal whorls 5; axial ribs 24 on 1st whorl, increasing to 26 on 5th, from suture to suture, straight but slightly oblique (retractive) on later whorls; crossed by 3 spiral striae on 3rd whorl, dividing the ribs into 4 nodules, on 4th whorl upper (sutural) nodules divided by an additional stria, and 2 striae between 1st (sutural) and 2nd series of nodules, producing a narrow lira between the two series; on 5th whorl a 2nd stria dividing upper nodules into 3, and the narrow lira is repeated between each pair of nodules, thus broad and narrow nodules alternating; on base 7 additional series of nodules (or broad lirae) alternating with narrow lirae. Internal parietal callus cariniform, columella nodulose anteriorly, glaze strong, thick and somewhat bulbous. Outer lip reflexed, thickened, glazed, internally plicate. 20 × 11·5 mm., and plump form 18 × 12 mm.

Operculum and radula?

Cream or buff or greyish, 3 indistinct darker greyish bands: one subsutural, one peripheral, and one at bottom of base; columella glaze and outer lip white, aperture internally with 3 more or less distinct brownish bands.

Dead: Mozambique (Marrat); Durban (Krauss, Sowerby, Tomlin, S. Afr. Mus.).

Living: Inhambane (S. Afr. Mus.); Delagoa Bay (U.W.).

Distribution. Mauritius (S. Afr. Mus.); Red Sea; Philippines and Australia (Marrat).

Remarks. The Inhambane specimens were evidently taken alive because the animals have been eaten out by Anthrenus (larval skins remaining in aperture), but the opercula have been lost.

N. martensi Thiele 1925 from Dar-es-Salaam, should be compared with this species.

Nassa eusulcata Sow.

Fig. 22(*f*)

1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 94, pl. 2, fig. 8.
1928. Tomlin. loc. cit., p. 317.

Protoconch 2 (2½) whorls, smooth. Postnatal whorls 7; axial ribs 13–14 on 1st whorl, increasing to 18 on last, but often on back of outer lip additional ribs crowded together to a total of 20–26, from suture to suture, slightly oblique (retractive); crossed by 3 spiral striae on 1st–4th whorl, 4 on 5th, 5 on 6th, and 6 on 7th whorl, the uppermost stria however from 4th whorl onwards becoming a well-marked sulcus separating the tops of the ribs as a subsutural series of nodules; on base 7 (8) striae become stronger and more open sulci anteriorly, with rather sharp intervening lirae, the intersections slightly nodular. Internal parietal callus cariniform, followed by columella nodules, glaze narrow, not spreading over base. Outer lip plicate within. 19 × 10 mm.

Operculum broadly oval, 3 strong serrations on outer, 2 on inner margin, 4 × 3 mm. in 17 mm. shell.

Radula with 60–65 rows, central plate with 10 cusps (12 in one of three specimens), outermost on either side minute, no intermediate plate, lateral plate without denticles between the 2 cusps.

Living (and dead): off Tugela River, and off O'Neil Peak (Zululand), 40–55 fathoms (Sowerby, Tomlin, S. Afr. Mus. P.F. coll.).

Nassa natalensis Smith

1903. Smith. *Proc. Mal. Soc.*, v, p. 373, pl. 15, fig. 6.
1928. Tomlin. loc. cit., p. 322.
1936. Peile. *Proc. Mal. Soc.*, xxii, p. 140 (radula).

Protoconch ? Postnatal whorls 6, profile angular in middle of whorl; axial ribs 12 on 2nd whorl, 12–13 on later whorls, strong on early whorls, less

so on last whorl, nodular at top below suture and at periphery, continued over base where they are also nodulous; 6 lirae on base, obscure above, stronger below. External parietal callus strong, bulbous, internal callus cariniform, columella smooth, carinate anteriorly, glaze rather broad but not extending over base, edge free on rostrum. Outer lip thickened, with varix, internally plicate. 20 × 12·5 mm. (Smith's figure: 21 mm.)

Operculum ?

Cream or greyish, on body whorl a series of horizontally oblong dark brown streaks between the ribs, forming a narrow broken band from posterior end of aperture, mostly concealed by suture in earlier whorls (Smith's figure shows the dark band crossing the ribs as well as the intervals); Smith mentioned one specimen as being 'a rich brown colour with a white line above the middle of the body whorl'.

Radula (Peile) lateral plate with denticles between the 2 cusps, inner edge of the inner cusp sometimes serrulate, ? intermediate plate (not mentioned).

Natal (Reeve, Smith, S. Afr. Mus.); Mozambique Island (U.W.).

Nassa arcularia Linn.

Fig. 22(*i*)

1852. A. Adams. *Proc. Zool. Soc. Lond.* (for 1851), p. 98 (*sulcifera* = monstrosity).
1880. Von Martens. *Mauritius & Seychellen*, p. 242 (incl. *rumphii* Desh. and *pullus* Lam.).
1928. Tomlin. loc. cit., p. 314, p. 324 (*pullus*), and p. 327.
1930. Bisacchi. *Ann. Mus. Civ. Genoa*, lv, p. 44, and p. 47, figs. 1–3 (*pullus*).
1933. Krige. *Tr. Geol. Soc. S. Afr.*, xxxv (1932), p. 52.
1938. Adams & Leloup. *Mem. Mus. Roy. H. N. Belg.*, Hors Série II, 19, p. 183, pl. 8, fig. 7 *a*, *b* (juv.).
1942. Gravely. *Bull. Madras Govt. Mus.*, n.s. V, no. 2, p. 60 (in key), fig. 11 *e*. (*pulla*).
1952. Braga. *Anais Est. Zool. Ultramar*, vii, 3, p. 74, pl. 3, fig. 2.

Protoconch 1½ whorls, smooth. Postnatal whorls 5; axial ribs 19–20 on 1st and 2nd whorls, 16–17 on 3rd, 15 on 4th, 13–15 on 5th, suture to suture, slightly oblique (retractive), continued on base except on last portion of 5th whorl where there are 4–6 oblique costae followed by the labral varix; crossed by 3 spiral striae, equidistant, the uppermost a little distance below the coronal knobs, 5–6 striae on base and 3 on rostrum in juv., tending in adult to become open grooves. Parietal callus in adult nodular, columella concave, anteriorly crenulate and subcarinate, glaze in adult extending over nearly half the last whorl, thickened and forming a flat polished 'sole', edge free and varicoid. Outer lip thickened in adult, internally plicate. 25 × 19 mm., and 27 × 19 mm.

Operculum broadly subtriangular, broader than long, serrate on both margins, 5 × 6 mm. in 23 mm. shell.

Yellowish-grey, outer lip and columella glaze white, aperture within brownish or violaceous with a pale spiral band which is not visible externally except faintly in juveniles.

Radula with *c.* 65 rows, central plate with 16 cusps, outermost one on either side minute, intermediate plate oval, lateral plate without denticles between the 2 cusps.

Fossil, Pleistocene: Durban (Krige, Tomlin).

Dead: Port Elizabeth (Sowerby).

Living: Natal (Krauss); Durban, Delagoa Bay, Mozambique Island (S. Afr. Mus.). Inhambane, Portuguese East Africa (U.C.T.).

Distribution. Mauritius, Réunion, Seychelles, Madagascar, Red Sea, Aden, Indo-Pacific.

Nassa gemmulata (Lam.)

Fig. 22(*g*)

1816. Lamarck. *Tabl. Encycl.*, Livr. iv, pl. 394, figs. 5 *a*, *b*, and Liste, p. 1 (*Nassa clathrata*, n. et f. only). (Not Livr. iii, 1827, as given in Tomlin.)
1822. id. *Anim. sans. Vert.*, vii, p. 271 (*Buccinum g.*).
1859. Chenu. *Man. Conchyl.*, i, fig. 765.
1886. Watson. *Challenger Rep.*, xv, p. 176.
1901. Melvill & Standen. *Proc. Zool. Soc. Lond.*, ii, p. 412.
1928. Tomlin. loc. cit., p. 318.

Protoconch ? Postnatal whorls 7; axial ribs 14 on 1st whorl, 15 on 2nd, 17 on 3rd, 22 on 4th, 28 on 5th, 24 on 6th, and 20 on last whorl, suture to suture, straight, oblique (retractive), continued across base; crossed by 3 spiral sulci on 1st–3rd whorls, 4 on 4th–6th, and 5 on later part of 6th and on 7th whorl, sulci narrow and deep especially on later whorls, dividing the ribs into rounded nodules, the uppermost forming a coronet over the sunken suture; 3 additional sulci on base, and a deep groove separating lowermost nodules from the reflexed rostrum, which has 4–5 striae. Internal parietal callus nodiform, columella more or less granulose, glaze extending over half base, edge free on rostrum. Outer lip internally plicate. 28 × 13·5 mm.

Operculum broader than long, serrate on both margins, 4 × 6 mm. in 28 mm. shell.

Buff with orange or brown irregular suffusions, aperture and glaze white.

Radula with 70 rows, central plate with 9 cusps, intermediate plate oval, lateral plate with rather stout inner cusp, no denticles between the 2 cusps.

Durban (Smith, ? dead).

Living: Inhambane, Portuguese East Africa (U.C.T.).

Distribution. Red Sea, Persian Gulf, Karachi, Indo-Pacific to Japan.

Nassa plicatella A. Ad.

1852. A. Adams. *Proc. Zool. Soc. Lond.* (for 1851), p. 111.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 9.
1912. Dautzenberg. *Ann. Inst. ocean.*, vol. 5, fasc. 3, p. 32.
1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, 7, p. 14.
1928. Tomlin. loc. cit., pp. 323 and 327.
1931. Lamy. *Bull. Mus. Paris*, (2) III, p. 304.
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), pp. 34, 46.

Protoconch $1\frac{1}{2}$ (2) whorls, diam. 1, alt. 0·6 mm., smooth. Postnatal whorls 5, profile evenly convex; axial ribs on 1st whorl 12 or 13 (junction with protoconch indistinct), 13 on 2nd whorl, increasing to 17–18 on 4th and to 20–24 on 5th whorl, suture to suture, slightly oblique (retractive), extending to base, sometimes duplicated and irregular or obscure on last half whorl; crossed by spiral lirae 5–6 on 2nd, increasing to 8–9 on 5th whorl, intersections slightly nodulose, 7–8 additional lirae on base, one (? more) on rostrum. No parietal callus, columella smooth, rather conspicuously carinate anteriorly, glaze narrow. Outer lip not toothed at either end, internally feebly plicate if at all. 27 (protoconch missing) × 15 mm.

Operculum triangularly oval, serrate on both margins.

Cream or greyish, darker in the intervals between the ribs when wet, uniform when dry.

Radula with 70–75 rows, central plate with 10 cusps, the outermost on either side minute, no intermediate plate, lateral plate without denticles between the 2 cusps.

Fossil (late Tertiary): Saldanha Bay (Tomlin, Haughton).

Dead: Walfish ('Wallwich') Bay (Adams, Lamy); Great Fish Bay, Angola (von Martens); Angra Pequena (Lüderitzbucht) (von Martens); Table Bay (Tomlin, S. Afr. Mus.).

Living: Mossamedes and Praya Amelia, littoral and 15–35 metres (Dautzenberg); Port Alexander (Odhner); Langebaan, Saldanha Bay, low tide (U.C.T.).

Remarks. Sowerby's record from Natal is not acceptable.

The number of ribs varies somewhat: in one specimen there are ?12 on 1st whorl (worn), 13 on 2nd, 12 on 3rd, 12 on 4th and 13 on 5th whorl, the intervals consequently being noticeably wider than normal. The Saldanha Bay examples are transitional.

Odhner (1923. *Goteb. K. Vet. Handl.*, xxvi, 7, p. 14, pl. 1, figs. 6, 7) described *angolensis* similar to *plicatella* but smaller, 14·2 × 7·6 mm., also from Port Alexander, 16 fathoms.

Nassa desmoulioides Sow.

Figs. 22(*d*), 23(*c*)

1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 219, pl. 4, fig. 1.
1928. Tomlin. loc. cit., p. 317.
1956. Knudsen. *Atlantide Rep.*, 4, p. 49, pl. 2, fig. 3 (laps. cal. *desmouleoides*).
1957. Franca. *Anais J. Invest. Ultramar.*, x, 2, p. 29, pl. 1, figs. 1, 2, pl. 2 (laps. cal. *desmouleoides*).

Protoconch 2 ($2\frac{1}{2}$) whorls, diam. 1–1·25, alt. 0·75–0·8 mm., smooth. Postnatal whorls 6, profile rounded but with squarish shoulder at the level of the sunken suture; axial ribs 16–17 on 1st whorl, increasing to 23–25 on 5th and 30–32 on 6th whorl, suture to suture, straight, narrower than intervals, sometimes on later part of 6th whorl becoming irregular or even obsolete;

crossed by spiral lirae 7 on 1st and 2nd whorls, 8 on 3rd, increasing to 10–11 on 6th, intersections more or less nodular, especially on upper part of whorls; 7–8 additional lirae on base and 3–4 on rostrum. Parietal callus subcariniform, columella concave, feebly crenulate and carinate anteriorly, glaze thin, extending scarcely halfway across base, edge free. Outer lip internally plicate. 21 × 13 mm.

Operculum thin, triangularly ovate, serrate on both margins, 5 × 3 mm. in 18 mm. shell.

White with irregular blotches and axial streaks of orange-brown, operculum pale corneous.

Radula with 70-80 rows, central plate with 10–12 cusps, the outermost one on either side minute, no intermediate plate, lateral plate without denticles between the 2 cusps.

Dead: Zululand to Algoa Bay and Agulhas Bank, 40–100 fathoms: most northerly locality off Cape Vidal (Zululand), most westerly and southerly Brown's Bank, approx. 36½° S. 21° E. (S. Afr. Mus. P.F. coll.).

Living: off Cape Natal (Durban), 54 fathoms; off Great Fish Point, 53 fathoms (S. Afr. Mus. P.F. coll.); 29° 46′ S. 31° 17′ E. 60–70 fathoms (U.C.T.).

Distribution. Off Sierra Leone (4° 24′–13° 43′ N. 7°–17° 23′ W.), 65–90 metres; off Portuguese Congo (5° S. 11° 14′ E., 55 metres) (Knudsen); off Cabinda (Franca).

Remarks. The majority of examples do not quite conform with Sowerby's description. He said the ribs number '10 on the penultimate [i.e. 5th] whorl'; this might be correct if he counted only those visible on one half of the whorl, but his figure showed 6 (or 7). I have seen one 5-whorled specimen and one juvenile taken together with a normal (as here described) specimen (off Cape Natal, 54 fathoms) with 12 axial ribs on 1st whorl, 13 on 2nd, 14 on 3rd, 16 on 4th and 18 on 5th whorl; the intervals between the ribs are consequently very obviously wider than the ribs. There is no doubt that they are conspecific, apart from there being an occasional intergrading example.

The occurrence of this species in a locality in the western Indian Ocean would not have been unexpected, but its discovery by the *Atlantide* in tropical West African waters is very surprising. The West African specimens have been compared by Knudsen with Sowerby's type material in the British Museum, and the identity may thus be accepted.

Nassa speciosa A. Ad.

Fig. 22(*c*)

1852. A. Adams. *Proc. Zool. Soc. Lond.* (for 1851), p. 100.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 26 (*plicosa*).
1907–8.* Melvill & Standen. *Tr. Roy. Soc. Edinb.*, xlvi, p. 153 (*Phos plicosa*).

* Issued separately Sept. 1907. The 1909 Report is the same as that in the Transactions, with different pagination; the original pagination is given at the foot of each page.

1909. id. *Sci. Res. Scotia*, v. p. 123 (*Phos plicosa*).
1928. Tomlin. loc. cit., p. 324 and p. 327 (*plicosus* Dnkr., non Menke).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 59 (*plicosa*).
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), pp. 33, 46 (*plicosa*).
1936. Peile. *Proc. Mal. Soc.*, xxii, p. 140 (*plicosa*, radula mentioned).

Protoconch 2 ($2\frac{1}{2}$) whorls, diam. 0·75, alt. 0·5 mm., smooth. Postnatal whorls 8, profile nearly straight but with a sloping shoulder near top of whorl; axial ribs 12 (13) on 1st whorl, 12–13 on 2nd, 14–15 on 3rd, 4th, and 5th, 13–14 on 6th, 12–13 on 7th, and 10–12 on last whorl, suture to suture, extending across base, straight or slightly sigmoid and protractive on base of last whorl, often (in adult) additional plicae on back of outer lip but not reaching to the shoulder; crossed by spiral lirae 4–5 on 1st and 2nd whorls, 6 on 3rd, 7 on 4th, increasing to 12–15 on last whorl, the 3–4 (5) next the suture finer than the others which are variable, often wider and narrower lirae alternating, or a wide lira is divided by a fine stria; 8–9 additional lirae on base with finer intermediaries, 7–8 on rostrum, intersections with ribs on lower half of base and back of outer lip more or less nodulose. Internal parietal callus blunt, columella smooth, bluntly carinate anteriorly, glaze extending more than half-way across base, not very thick, edge adnate except on rostrum. Outer lip internally more or less plicate. 31 × 16 mm. Two examples from the same haul 28 × 16 mm. and 29·5 × 14·5 mm.

Operculum oval, margins entire, 8 × 4·5 mm. in 29 mm. shell.

Buff or cream, unicolorous, periostracum brown, columella glaze and aperture white, anterior canal purplish-brown, operculum dark brown. Animal pale, speckled with grey.

Radula with *c.* 80 rows, central plate with antero-lateral angles somewhat acutely produced, with 9 cusps, no intermediate plate, inner cusp of lateral plate with 1–3 minute denticles on its outer margin (i.e. facing the outer cusp).

Fossil, late Tertiary: Saldanha Bay. (Tomlin, Haughton).

Living (and dead): from off Umhloti River (Natal), East London, Port Alfred, Algoa Bay, Agulhas Bank, False Bay, Table Bay, to Saldanha Bay, low tide to 50 fathoms (S. Afr. Mus. P.F. coll.); 34° S. 25° 46′ E., 41 fathoms, 33° 47′ S. 26° 4′ E., 26 fathoms, 33° 3′ S. 28° 11′ E., 31 fathoms, and 31° 38′ S. 29° 34′ E., 26 fathoms (U.C.T.).

Remarks. Plump and slender forms occur. The number of axial ribs varies slightly. In beach-worn examples the shoulders of the ribs often appear as prominent white tubercles.

Von Martens stated that the margins of the operculum were serrate, but this conflicts with all the specimens in S. Afr. Mus., except in one specimen where the outer edge is crenulate, probably due to wear or corrosion.

Bisacchi (1930. *Ann. Mus. Civ. Genoa*, lv, p. 59) refers Red Sea examples to a South African variety figured, but not described, by Marrat (1877. *New Forms . . . Nassa*, pl. 1, fig. 11). This is probably a misidentification.

Nassa plebecula Gould

1860. Gould. *Proc. Boston Soc. Nat. Hist.*, vii, p. 332.
1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 6, pl. 8, figs. 4, 5 (*producta*).
1928. Tomlin. loc. cit., p. 323.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 57, and p. 57, pl. 13, no. 424 (*subcancellata*).
? 1932. id. ibid., p. 57, pl. 13, no. 423 (*erecta*).

Four worn specimens in S. Afr. Mus., with apices worn and only 5 or 6 whorls remaining. Sowerby gave the number (total) of whorls as 9, which seems a little excessive even if the protoconch were included.

On the last 4 remaining whorls the axial ribs increase regularly by one rib on each successive whorl, the numbers being resp. 11–13, 12–14, 13–15, and 14–16. The spiral lirae number resp, 4, 5, 6, and 6; the uppermost lira immediately below the suture of preceding whorl is slender, and on last whorl or 2 whorls a 7th lira may be partly visible in the suture with the following whorl. 5–6 additional lirae on base.

Sowerby said the outer lip was plicate within, and the columella rugose; his figure shows the plicae and a small parietal nodule. The present specimens show no parietal nodule, or labral tooth, or plications, the columella is smooth, and the glaze narrow.

13·5 × 5 mm. (Sowerby); 12 × 4·5 mm. (S. Afr. Mus.) Durban (Sowerby).

Distribution. Mauritius (Tomlin), Japan (Gould), Polynesia (Tomlin).

Remarks. Tomlin said the type of *producta* (in British Museum) was a poor specimen, but Sowerby's figure gives the impression of a rather well-preserved specimen.

Nassa papillosa (Linn.)

1758. Linne. *Syst. Nat.*, 10th ed., p. 737, sp. 393 (*Buccinum p.*).
1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 400, figs. 2 *a*, *b*, and Liste, p. 2.
1880. Von Martens. *Mauritius & Seychellen*, p. 241.
1952. Braga. *Anais Est. Zool. Ultramar.*, vii, 3, p. 75, pl. 2, fig. 5.

Braga records this species (dead) from Mozambique. It occurs in Mauritius, Réunion, Madagascar, Aden, and Indo-Pacific.

Nassa vidalensis n. sp.

Fig. 24(*b*)

Protoconch 3½ whorls, diam. 1·3, alt. 1·2 mm., smooth, 2nd and 3rd whorls with peripheral keel, which sinks down on last half whorl into the suture with 1st postnatal whorl, junction with 1st postnatal whorl deeply concave. Postnatal whorls 3, slightly turreted, sutures deep, profile gently convex; all whorls smooth, without any axial or spiral sculpture, except faint indications of 2–3 fine spiral striae at top of 2nd and 3rd whorls, best seen at back of outer lip, indications of 4–5 striae at bottom of base. Outer lip thickened, varicoid, feebly plicate within. 6 × 4 mm.

Off Cape Vidal (Zululand), 80–100 fathoms (S. Afr. Mus. no. A8839, P.F. coll.).

Remarks. A single unworn specimen, similar in shape to *dissimilis* Watson 1886, and *aracanensis* Smith 1899, 1901; and with carinate protoconch similar to that of *babylonica* Watson 1882, 1886, *agapeta* Watson 1882, 1886, and *psila* Watson 1882, 1886.

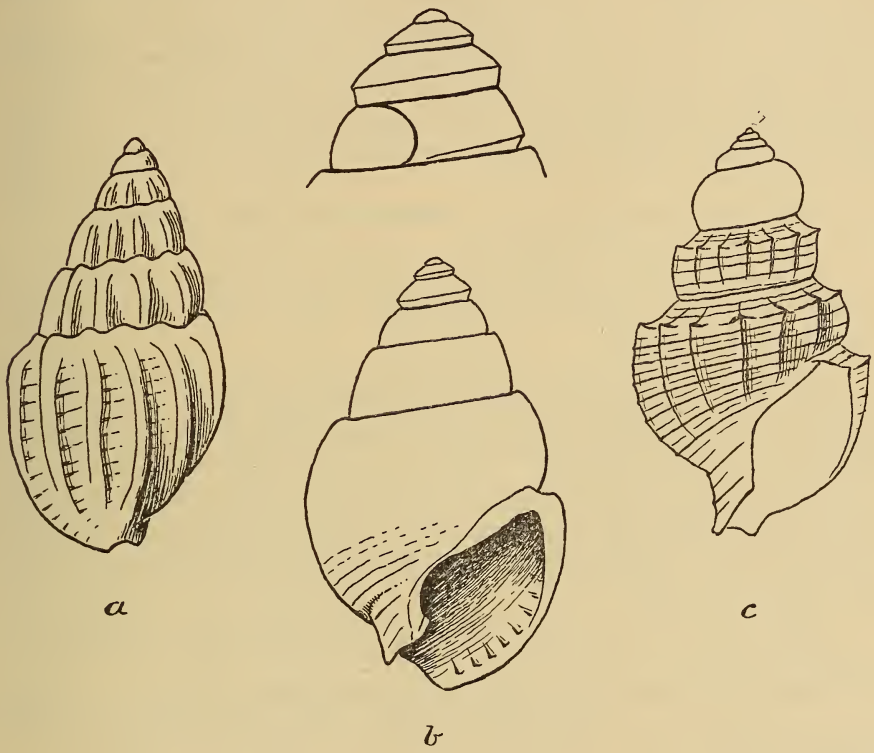

Fig. 24.
(*a*) †*Nassa scopularcus* n. sp. (*b*) *N. vidalensis* n. sp. (*c*) *Nassa* sp. juv.

Nassa kraussiana (Dnkr.)

Figs. 22(*k*), 23(*f*)

1848. Krauss. *Südafr. Moll.*, p. 123, pl. 6, fig. 18.
1906. Smith in Rogers. *10th Rep. Geol. Comm.* (*Cape*) for 1905, p. 291.
1920. Wybergh. *Tr. Geol. Soc. S. Afr.*, xxii (1919), p. 66.
1928. Tomlin. loc. cit., p. 320 (references), and p. 327.
1936. Peile. *Proc. Mal. Soc.*, xxii, p. 140, fig. 4 (radula).
1952. Braga. *Anais Est. Zool. Ultramar.*, vii, 3, p. 75, pl. 3, fig. 3.

Broadly oval when young, obliquely ovoid and plano-convex when adult. Protoconch $1\frac{1}{2}$ whorls, diam. 0·5, alt. 0·3 mm., smooth. Postnatal whorls 4; axial ribs 14–15 on 1st whorl, 15–16 on 2nd, *c.* 16 on 3rd but feeble and evanes-

cent on later part of whorl, none on 4th whorl, but usually a few irregular plicae on back of outer lip, ribs extending from suture to suture, slightly oblique (retractive); 4–5 striae on back of outer lip anteriorly (not visible after callus is fully formed); sometimes a well-incised spiral stria in upper part of 4th whorl (distant about $\frac{1}{7}$ of height of whorl from suture) traceable back on to the 3rd and part of 2nd whorl where it is lost among the axial ribs; sometimes also 3–5 similar striae below the periphery but less distinct than those on base. Columella concave, smooth; glaze thick and extensive, when fully developed spreading over whole of base and enveloping half the shell up to apex, and forming with the callously thickened outer lip a smooth polished 'sole', the actual aperture occupying only about $\frac{1}{5}$ or $\frac{1}{6}$ part of the sole. 11 × 8 mm. 13 mm. long (Braga). Smallest example with fully developed callus 6 × 4·75 mm.

Operculum broader than long, almost semicircular, apex worn, one or two strong teeth on both margins.

Ochraceous with 3 purplish-brown spiral bands (sutural, peripheral, and basal), 'sole' white, yellowish, or (especially outer lip) purplish; back often stained green with algae.

Radula with 55–65 rows, central plate with 12 cusps and a minute one on either side externally, no intermediate plate, lateral plate with inner cusp broad, curving inwards (medianly), its inner (median) margin with 3–5 denticles.

Fossil (late Tertiary, Pleistocene, and Recent): Bredasdorp (Wybergh); Durban, Port Elizabeth, Plettenberg Bay, Knysna, Little Brak River (see Tomlin, p. 327). Also Sedgefield, near Knysna (A. R. H. Martin. *S. Afr. J. Sci.*, 52, p. 187, 1956).

Dead: Durban, Port Alfred, Port Elizabeth, Jeffreys Bay, Still Bay (auct. and S. Afr. Mus.).

Living: Keurbooms River estuary (Plettenberg Bay); Delagoa Bay (S. Afr. Mus. coll. K.H.B.). Delagoa Bay (U.W.). Inhambane, Portuguese East Africa (U.C.T.).

Remarks. This characteristic species is an estuarine and littoral species; the specimens taken in 43 fathoms off East London (recorded by Tomlin) were dead.

Peile (1936, loc. cit., and 1939, *Proc. Mal. Soc.*, xxiii, p. 276) says *sordidus*, *echinatus*, *creniliratus* and *thersites* have similar lateral plates in the radula, the last two with intermediate plates in addition.

†*Nassa scopularcus* n. sp.

Fig. 24(*a*)

1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 20 (cf. *babylonicus*).

Turreted, resembling in general *babylonica* Watson, with strong axial ribs and, at first sight, no spiral sculpture.

Whorls $5\frac{1}{2}$ (6) including protoconch (tip of which is missing); axial ribs on 2nd whorl worn, not countable with certainty, 11 on 3rd and 4th, 12 on last whorl, from suture to suture, extending over base to columella glaze, straight, their tops forming a squarish subsutural shoulder. Faint traces of spiral lirae (? 6) between the ribs on part of 4th whorl, and 13 more distinct on last portion of last whorl. Outer lip not plicate within. 14 × 7·3 mm. White.

Late Tertiary marine beds, shore of lagoon, south of Bogenfels, South West Africa (S. Afr. Mus. A9230 coll. S. H. Haughton).

This shell was seen by Tomlin, who said 'nothing Recent like it except *babylonica*, and it is quite distinct from that'. It has fewer axial ribs; and when fresh the spiral lirae would probably have been much more prominent than in *babylonica*.

Bogenfels = Arch-rock = *scopularcus*.

Nassa sp. juv.

Fig. 24(*c*)

Juv.—Protoconch 5 whorls, alt. and diam. 1·3 mm., smooth, profile of the last whorl strongly convex, not carinate, a few pliculae before the junction with 1st postnatal whorl, which is abrupt. Postnatal whorls 2, shouldered; axial ribs 13 on each whorl, forming small points at the shoulder, slightly retractive; crossed by spiral lirae on 1st whorl 1 between suture and shoulder, later 2, on 2nd whorl 2, below shoulder 3 on each whorl, on 2nd whorl one intermediary between each pair, on base 3 additional and 2 on rostrum, with intermediaries. 5·5 × 3 mm.

Protoconch and 1st whorl white, 2nd whorl pale buff, faintly brown above shoulder, and with 2 faint brown bands below, one from upper margin of aperture, the other from about middle of columella.

Off Umkomaas (Natal), 40 fathoms, one (S. Afr. Mus., Reg. No. A8888, P.F. coll.).

Remarks. Larger, 5·5 mm. with 2 (postnatal) whorls, than the East Indies *patricia* Thiele 1925, 3·5 with 3 whorls; but otherwise similar, and likewise with two brown bands. Thiele said the protoconch of *patricia* was feebly keeled on last whorl (as in *babylonica*), but in the present specimen it is not keeled and moreover is very much more prominent; in fact much like that of some Cymatiids or Bursids.

The resemblance to *arakanensis* Smith 1899 and 1901 is not so close, and here also the protoconch (especially the 5th whorl) is not nearly so prominent, and the spiral lirae are more numerous.

Although quite distinct among the South African species, this juvenile may belong to one of the numerous Indo-Pacific species, and is better left pro tem. without a name.

Gen. Demoulia Gray

1838. Gray. *Ann. Mag. Nat. Hist.*, i, p. 29.
1847. id., *Proc. Zool. Soc. Lond.*, p. 140 (*Desmoulea*).
1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 326.
1929. Thiele. *Handbuch*, i, p. 323 (*Desmoulea*, subgen. of *Nassa*).

Demoulia abbreviata (Gmelin)

Fig. 22(*l*)

1928. Tomlin. loc. cit., p. 326.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 60, pl. 14, no. 441 (juv.).

Subglobular, with numerous conspicuous spiral costae. Protoconch 2 whorls (tip missing), diam. 1·25–1·5 mm., smooth. Postnatal whorls 6 (7). Periostracum thin, fibrous-fimbriate. 38 (protoconch missing) × 28 mm.; plump and slender forms 33 × 26 mm. and 35 × 24 mm.

Operculum thin, triangular, edges scarious, 9 × 9 mm. in 30 mm. shell.

White, periostracum brown, operculum amber.

Radula with *c.* 95 rows, central plate with 9 cusps, lateral plate with inner cusp slender.

An egg-capsule removed from oviduct of animal in 30 mm. shell was 13 mm. in length, and 3–3·5 mm. in cross-section, cylindrical, somewhat triquetral in section (but this may not be the true shape when the capsule has been laid and has hardened).

False Bay to Algoa Bay and Natal, 18–52 fathoms (Tomlin, S. Afr. Mus. P.F. coll.). St. Francis Bay, 80–100 metres (von Martens).

Living: False Bay, 27 fathoms; off Knysna, 52 fathoms; Algoa Bay, 31 fathoms (S. Afr. Mus. P.F. coll.).

Demoulia retusa (Lam.)

1816. Lamarck. *Tabl. Encycl. Meth. Livr.*, iv, pl. 394, figs. 3 *a*, *b*, and Liste, p. 1. (*Nassa ventricosa* n. et f. only) (not Livr. iii, 1827, as given by Tomlin).)
1822. id. *Anim. sans Vert.*, vii, p. 270 (*Buccinum r.*).
1928. Tomlin. loc. cit., p. 326.

Ovoid, with numerous fine spiral lirae. Protoconch 2 ? whorls (tip missing), diam. 1·3 mm., smooth. Postnatal whorls 5 (6). Periostracum thin, smooth. 27 (protoconch missing) × 19 mm.

Variously blotched and marked with brown, usually two speckled spiral bands and 'necklace' of dark and pale spots at top of whorls, periostracum pale brown.

False Bay, Agulhas Bank, and Zululand, 5–55 fathoms (Tomlin, S. Afr. Mus. P.F. coll.).

Three living specimens were obtained by the *Pieter Faure* in False Bay, 5 fathoms, but the animals were not preserved.

Gen. Bullia Griffith

1834. Griffith in *Cuv. Anim. Kingd.*, xii, pl. 37.
1840. Swainson. *Treat Malac.*, p. 302 (*Leiodomus*).
1841. Gray. *Proc. Zool. Soc. Lond.*, xv, p. 139 (*Dorsanum*).
1929. Thiele. *Handbuch*, i, p. 322.
1937. Peile. *Proc. Mal. Soc.*, xxii, p. 183 (radulae) (also comments on Thiele's arrangement).
1938. id. ibid., xxiii, p. 6 (radula).

Protoconch, junction with 1st postnatal whorl not sharply demarcated. Operculum with apical nucleus, but shape variable: of more or less normal size, subtriangular, margins entire or serrate; or ovate with incurved apex; or much reduced in size.

Animal with large foot capable of considerable expansion, its antero-lateral corner more or less pointed (tentaculate) (*Bullia*) or rounded (*Dorsanum*), posteriorly with two 'tails' (*Bullia*) or without tails (*Dorsanum*); eyes present (*Dorsanum*) or absent (*Bullia*).

Radula formula 1.1.1, central plate with several cusps, lateral plate with 2 large cusps, the inner one bifurcate (*Bullia*) or trifurcate (*Leiodomus*) or with additional denticles between it and the outer cusp. Considerable variation occurs in the cusps of the lateral plates, even in the same radula (cf. Peile, 1937), and this fact is somewhat against Peile's argument for separating *Leiodomus* from *Bullia* (loc. cit., p. 184).

The radulae of eleven species, including those already described by Peile, are here described and nine of them are figured.

Remarks. Many parts of the South African coast, where sandy beaches occur, await exploration, and doubtless will yield interesting results. Needless to say: *living* animals are required for study.

With the exception of the egg-capsule of *tenuis* described below, the reproduction and life-history of these arenicolous molluscs seem to be unknown. I have found juveniles of *rhodostoma* as small as 4 mm. long in the shifting sand between tide marks. Do the adults (of the littoral species) retreat off-shore to less turbulent water for spawning, or do they burrow deeply between tide marks?

Ancilla osculata Sow. is transferred to the present genus, and the suggestion is made (see also p. 62) that *Bullia ancillaeformis* Smith is really an *Ancilla*.

Key based on the operculum

I. Operculum of more or less normal size.
  A. Margins serrate.
    1. Shell crimped at sutures . . . . . *similis*
    2. Shell not crimped . . . . . *digitalis*
  B. Margins smooth.
    1. Subtriangular, apex truncate or excavate . . . . . *osculatata* / *annulata*
    2. Ovate, apex subacute, incurved.
      a. Almost completely filling aperture . . . . . *natalensis*
      b. Not completely filling aperture.
        i. Shell smooth . . . . . *rhodostoma*
        ii. Shell lirate . . . . . *pura*
        iii. Shell pustulose . . . . . *mozambicensis*

II. Operculum much reduced in size.
A. Aperture of shell longer than spire . . . . . *laevissima*
B. Aperture subequal to spire. Parietal callus thick . . . . . *callosa*
C. Aperture less than spire (adult). Parietal callus thin . . . . . *tenuis*

Operculum unknown: *diluta*, *trifasciata*, *tenuistriata*, *ancillaeformis*,* *dulcis* Sow., (= *digitalis*), *almo* Bartsch (= *digitalis*), *lara* Bartsch (= ? *tenuis*), *aepynota* Bartsch (= ? *diluta*), *alfredensis* Bartsch (= *diluta*); and all Turton's 'species'.

Bullia similis Sow.

Figs. 25(*i*), (*j*), 27(*a*)

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 5, pl. 7, fig. 1.

Aperture 1–1⅓ times in spire. Protoconch diam. 0·3–0·5 mm. Whorls (total) 8 (8½). Parietal callus thin and narrow, not extending on to preceding whorl or visible at suture. Whorls smooth with a spiral sulcus near suture, the lira thus demarcated producing with the growth-lines a crimped or beaded sculpture beginning (clearly visible) from about 4th whorl; 6th whorl with 1–3 (4) very fine spiral striae, increasing to 6–7 on 7th whorl and 8–9 (sometimes 10–11) on last whorl, becoming stronger and easily visible on the latter, especially on upper and lower parts of whorl; on last whorl the crimping extends on to the lira below the sutural lira; growth-lines fine and close, making the striae punctate, especially on base; 7–8 additional striae on base, becoming stronger (sulci) near rostrum. Columella glaze thin. 26 × 11 mm. 31 × 15 mm. (Sowerby).

Operculum thin, triangularly ovoid, both margins serrate, 6 × 3·5 mm. in 21 mm. shell with 9 mm. aperture.

Cream or buff, with very faint orange or fawn undulate, arcuate, or zigzag axial flames.

Radula with about 60 rows, central plate subequal in width to lateral plate, base (excl. cusps) about 2½ times as wide as long, with 11 cusps, sometimes a minute denticle externally on one side or the other, lateral plate with inner cusp bifurcate, outer prong a little smaller and more slender than the inner (median) prong, sometimes a minute denticle between the prongs, outer prong itself sometimes bifid or bifurcate.

Fossil: raised beach, alt. 375 ft. at Durban-Umgeni (Geol. Surv.).

Living: off Cone Point (between St. Lucia and Durnford Bays, Zululand) to off East London, 12–27 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Close to *belangeri* Kien. in coloration, but the latter, as already remarked by Sowerby, has no crimping near the suture; also (Ceylanese specimens in S. Afr. Mus.) the middle portion of the whorls is without spiral striae.

* See note under *Ancilla bullioides*, p. 62.

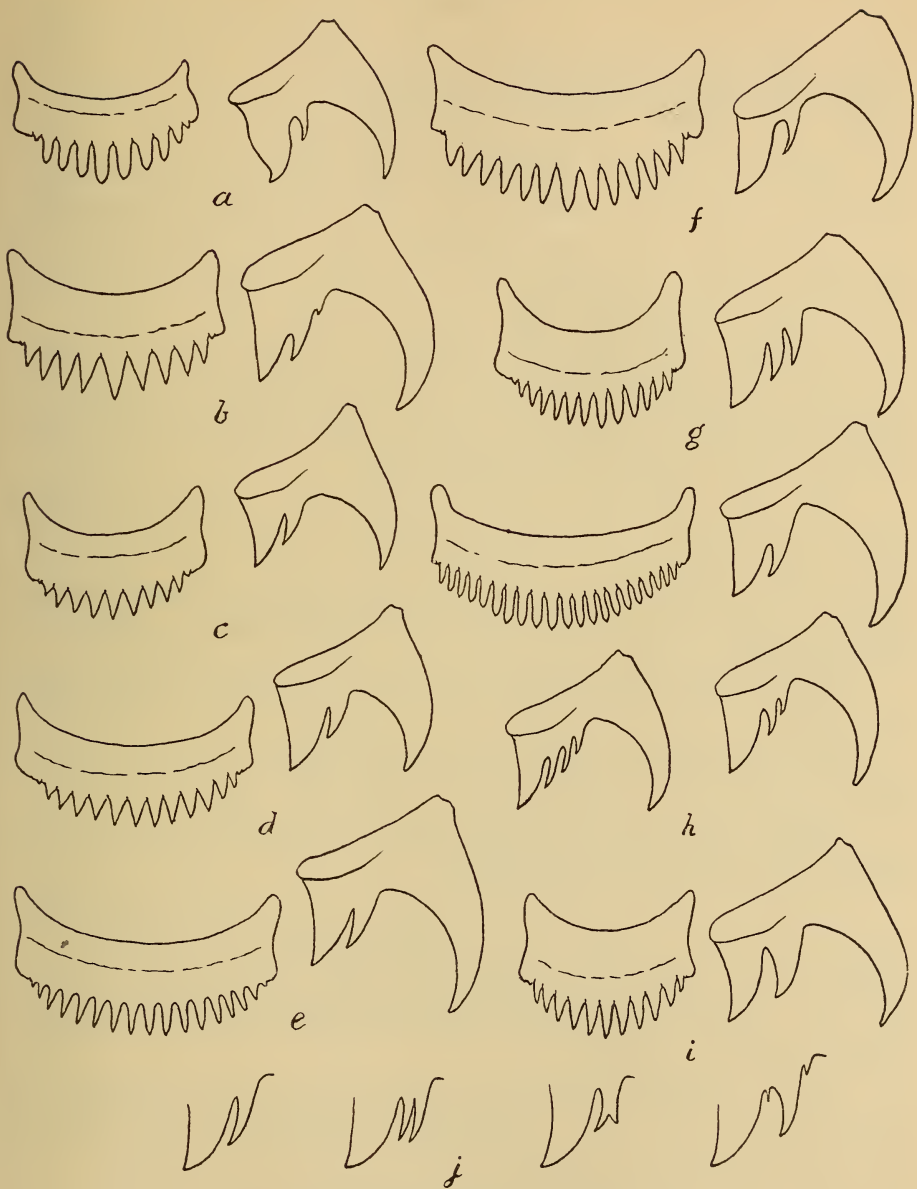

FIG. 25.

Central and lateral radula plates of *Bullia* (*a*) *pura* Melv.; (*b*) *tenuis* Gray; (*c*) *natalensis* (Krss.); (*d*) *mozambicensis* Smith; (*e*) *digitalis* Meuschen; (*f*) *annulata* (Lam.); (*g*) *rhodostoma* Rve.; (*h*) *laevissima* (Gmelin), with variants of lateral plate; (*i*), (*j*) *similis* Sow., with variants of inner cusp of lateral plate. In (*j*) the right-hand one is from the same radula as figured above; the three on the left are all from another radula.

Bullia osculata (Sow.)

Fig. 27(*b*)

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 3, pl. 1, fig. 6 (*Ancilla o.*).
1903. Smith. ibid., v, p. 364 (*Ancilla o.*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 35 (*Ancilla o.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 32, pl. 7, no. 243 (*Ancilla o.*).

Aperture 1–1¼ in spire. Whorls 6–7. Parietal callus thin and narrow, not extending on to preceding whorl and not visible at sutures. A single shallow and inconspicuous spiral stria immediately below the suture, and 2–3 on lower part of base (excluding those on rostrum). Columella glaze thin. 19 × 8 mm. Turton: 21 mm. long.

Operculum triangularly ovoid, margins smooth, apex truncate, 3·5 × 2 mm. in shell 14 mm. with aperture 5·5 mm.

Cream, with flame-like markings below the suture and around base, in addition with axial undulate lines (Turton, and S. Afr. Mus.); in the Cape Vidal specimens these lines are strongly zigzag.

Foot with antero-lateral corners rounded (but ?, only one example available), posteriorly with 2 well-developed 'tails', no eyes. Radula very like that of *similis*, with 55 rows, central plate about twice as wide as long (excl. cusps), with 11 cusps, the outermost one on one side minute, lateral plate subequal in width to central, inner cusp with both prongs stout, the inner larger than the outer.

Living: off Cove Rock (East London area), 22 fathoms (S. Afr. Mus. P.F. coll.).

Dead: Pondoland, the Kowie, Port Alfred (Sowerby, Bartsch, Turton). Cape Vidal, Zululand, 50 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Topotypes in S. Afr. Museum. The Cape Vidal specimens were identified by Sowerby, but not recorded.

Sowerby commented on the likeness of his species to a *Bullia*; indeed it seems surprising that he referred it to *Ancilla* because it lacks the basal groove characteristic of the *Olividae*. Neither Smith nor Bartsch queried its generic position. I had previously transferred it to *Bullia* on conchological grounds, but now a specimen containing the animal, found in one of the P.F. bottom-samples, settles the question.

Sowerby distinguished *similis* from *belangeri* Kien., but the present species is much nearer to the latter. Two Ceylanese specimens in S. Afr. Mus. (ex coll. Ross-Frames), 35 mm. long, have axial lines and flames, but they have two spiral striae at the top of each whorl, distinct from the early whorls onwards, the upper one of which becomes a sulcus on the later whorls; there are also 2 striae on lower part of the whorl.

The species is very like a slender form of *annulata* (of equal size and before the typical shoulder of the later whorls has developed), especially smooth examples in which the spiral striae are inconspicuous and obsolescent.

Bullia tenuistriata Tomlin

1920. Tomlin. *J. Conch.*, xvi, p. 87, text-fig. 4.
1923. id. ibid., xvii, p. 46.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 64.

Aperture about $1\frac{1}{3}$–$1\frac{1}{2}$ times in spire (as figured). Sutures deeply impressed; presumably therefore the parietal callus is thin and not visible on the preceding whorl. 17 spiral striae on penultimate whorl, and 15 on each of the preceding whorls, interstices smooth. Otherwise similar to *pura*. 16·5 × 6·5 mm. Turton: 25 × 10 mm.

Port Alfred.

Described from two dead specimens. Turton later found a larger one.

Remarks. Tomlin said it had 'some slight resemblance' to *pura*. In my opinion it has a very strong resemblance, amounting almost to identity. Compared with some specimens of *pura* in which the intermediary lirae are well developed (total number of lirae 15–17!) the only distinguishing feature is the sunken suture of *tenuistriata*, and that may well be only an individual aberration (cf. *alfredensis* Bartsch and *scalaris* Turton, both = *diluta*).

Bullia trifasciata Smith
Fig. 27(*f*)

1904. Smith. *J. Malac.*, xi, p. 34, pl. 2, fig. 17.

Distinguished from *annulata*, apart from the coloration, by being spirally striate from the 2nd whorl onwards, and by the uppermost stria (juv.) or (older specimens) the 2 uppermost striae being *on the actual turgid shoulder*.

Apex blunter, 1st whorl diam. at least 1·5 mm. (*annulata*: 1 mm.). Whorls (total) 7, turreted or pagoda-like, profile below shoulder almost straight (at least in later whorls). In perfectly fresh specimens the spiral striae could probably be traced on the 1st whorl (I have seen only worn specimens); on 2nd whorl 7 striae, on later whorls 8, 7–8 additional ones on base. 32 × 15 mm. Smith: 39 × 18 mm.

Operculum and animal unknown.

Brown with 3 darker spiral bands, that on the shoulder being the darkest; bleached specimens white with the bands more or less visible.

Dead: Port Alfred (Smith, Bartsch, Turton); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. Smith did not mention the one essential difference in the spiral sculpture between this species and *annulata*.

Bullia annulata (Lam.) Rve.
Figs. 25(*f*), 27(*e*)

1816. Lamarck. *Tabl. Encycl. Meth.*, p. 399, figs. 4 *a*, *b*, Liste, p. 2 (*Buccinum a.*, nom. et fig.).
1846. Reeve. *Conch. Icon.*, iii, Bullia no. 13.
1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 95, pl. 2, fig. 4 (with animal).
1903. Von Martens. *D. Tiefsee Exp.*, vii, pp. 28, 53.

1913. Bullen Newton. *Rec. Albany Mus.*, ii, p. 344, pl. 23, figs. 3, 4.
1937. Peile. loc. cit., pp. 183, 184, fig. 17 (radula).

Aperture in juv. subequal to spire, later $1\frac{1}{5}$–$1\frac{1}{3}$ in spire. Apical whorl diam. 0·75–1 mm. Whorls (total) 9 ($9\frac{1}{2}$), turreted or pagoda-like, profile below shoulder slightly convex. Parietal callus thin, not extending on to preceding whorl nor visible at suture on early whorls, but on later whorls often visible as a narrow irregularly undulate excrescence between suture and preceding whorl (sometimes visible and invisible on different parts of the same shell). No sculpture on first 5 whorls except from 2nd whorl onwards a single spiral stria on upper part of whorl near suture; on 6th and later whorls the subsutural stria becomes a sulcus and is followed by 7–8 striae across the whole whorl, on last 2 or 3 whorls these striae become stronger and can also be called sulci; the lira adjoining the suture from the 4th or 5th whorl onwards becomes stronger and forms a tabulate shoulder varying in strength, sometimes sloping, sometimes projecting almost perpendicular to the preceding whorl; 9–10 additional striae (sulci in large examples) on base. Anterior end of columella prominent, angularly carinate; glaze thin. 23 × 12 mm. 36 × 19 mm., 45 × 22 mm., 60 × 28 mm.; smallest specimen examined 4 × 2·75 mm. (but see *infra*).

Operculum in adult broadly triangularly ovoid, margins entire, apex truncate; in juveniles obliquely oblong, broader than long, apex excavate between 2 small points; 10 × 8 mm. in 39 mm. shell with 16 mm. aperture; juv. 2 × 3 mm. in 13 mm. shell with 6 mm. aperture.

Buff or fawn, with violaceous (darker fawn or fulvous in dead shells) marks on the shoulder, which frequently, especially in juveniles and half-grown examples, extend across the whorls as axial streaks and flames; operculum amber-brown.

Foot with antero-lateral angles pointed (or tentaculate, depending on the preservation), posteriorly with 2 long 'tails', no eyes. Radula with 85–90 rows, central plate about $1\frac{1}{2}$ times as wide as lateral plate, base (excl. cusps) about $3\frac{1}{2}$ times as wide as long, with 12 cusps, lateral plate with inner cusp bifurcate, its outer prong smaller and more slender than inner (median) prong.

Animal pale greyish, livery, or flesh-coloured.

Fossil, Mio-Pliocene: Redhouse near Rort Elizabeth (Newton).

Port Alfred (Bartsch, Turton); St. Francis Bay, 80–100 metres (von Martens); off Nieca River (East London area), 43 fathoms, 1 dead (S. Afr. Mus. P.F. coll.).

Living: False Bay, 18–20 fathoms; off Cape St. Blaize, 19 fathoms; Algoa Bay, 10–24 fathoms (S. Afr. Mus. P.F. coll.). Knysna and Algoa Bay (U.C.T.); 34° S. 25° 46′ E., 41 fathoms and 33° 47′ S. 26° E., 26 fathoms (U.C.T.).

The typical form has not been recorded farther east than Port Alfred and East London area, and farther west than False Bay.

Remarks. Sowerby's 1902 figure of the animal shows the two long 'tails', but not the true shape of the operculum.

Examples 10–11 mm. long with 5 whorls and the beginning of the 6th are the smallest I have seen which can without doubt be referred to this species, as they have striae on the middle of the last whorl. Below this size owing to the absence of these striae juveniles are not separable with certainty from juveniles of *laevissima*, although in the latter at an early stage the length of the aperture exceeds that of the spire.

Peile figured the radula of a juvenile 'just emerging from the earliest stages of growth'.

The Algoa Bay specimen recorded by von Martens as *mauritiana*, a species closely resembling *annulata*, is probably a misidentification.

There are 3 typical specimens in S. Afr. Mus. from Zanzibar, collected by E. L. Layard, on board H.M.S. *Castor*, 1856. Also a specimen from 'East Africa' (ex coll. Ross-Frames) not so strongly shouldered as typical specimens.

One specimen 23 × 12 mm., 7 whorls, from Still Bay (coll. Muir) is very smooth. The 6th and 7th whorls each have only 2 striae (one below the shoulder and one other), only the later part of the 7th whorl has faint traces of the usual 7–8 striae, and those on lower part of base are only moderately strong (normally they are strong enough to be called sulci). Although this specimen is a normal *annulata* in shape (proportions), the suppression of the spiral striae connects it with the following form or variety from the Natal coast.

Variety. In general similar to typical form but more slender and less strongly shouldered, especially on the earlier whorls. The 7th and 8th whorls show traces of the 2 striae at the top of the whorl, but even on the 8th whorl the upper one below the shoulder is very shallow and can scarcely be called a sulcus. In the largest specimen traces of 2 more striae on the upper part, and one or two on the lower part of the 8th whorl can be seen; and 7–8 additional ones on base, the lowermost of which are very shallow sulci.

Operculum as in *annulata*. Coloration as in *annulata*.

24 × 10·5 mm., 35 × 16 mm., 38 × 16·5 mm., 39 × 18 mm., and 43 × 19 mm. (contrast measurements given above for typical form).

Natal: fresh and somewhat worn specimens off Umkomaas, 13 fathoms; one fresh specimen off Durban, 54 fathoms; one fresh specimen off Tugela River, 37 fathoms; one with operculum (presumably taken alive, though animal not preserved) off Umhloti River, 27 fathoms (S. Afr. Mus. P.F. coll.).

Von Martens (1903) recorded *annulata* from Natal.

Tomlin saw the Tugela specimen and labelled it '*annulata* var.'.

†*Bullia magna* Haughton

1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 46, pl. 5, figs. 1, 4, 5.

Described from Quaternary deposits 20 miles north of the Orange River mouth, and from two localities near the Olifants River mouth.

Except for the absence of shoulders the shells might be *annulata*, and the anterior end of the columella projects prominently inwards as in this species,

but the parietal callus forms a ring 'behind the posterior margin of each whorl', which it does not in *annulata*.

Moreover *annulata* has not been recorded from the west coast.

Bullia tenuis Gray

Figs. 25(*b*), 26, 27(*g*)

1828. Wood. *Suppl. Index Test.*, p. 12 (nom et fig.).
1839. Gray. *Zool. of the 'Blossom'*, p. 128.
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 29.
? 1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 53, pl. 38, fig. 3 (*lara*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 61 and p. 61 (*lara*).

Aperture a little longer than spire (juv. 4 mm.), subequal to spire (*c.* 12 mm. shells), and a little less than spire ($1\frac{1}{6}$ times in spire) in larger shells. Apical whorl (protoconch) diam. 0·8–1 mm. Whorls (total) 8. Parietal callus on 3rd whorl extending $\frac{1}{4}$ of whorl above suture forming a prominent costa, less prominent on 4th whorl, and from 5th or 6th onwards forming only a thin glaze extending $\frac{1}{4}$–$\frac{1}{3}$ length of preceding whorl. On 4th and following whorls spiral striae over whole whorl, stronger at top and bottom, on later whorls (3) 4–5 at top and 4–5 at bottom persist but striae obsolescent on peripheral area, the striae at top closer together than those below, 8 additional striae on base. Columella glaze thin but extending over whole base and rostrum. 60 × 28 mm., smallest examined (beach-worn) 4 × 2·75 mm.

Fig. 26.

Bullia tenuis Gray. Egg-capsule with embryo. Central plate of the 1st, 5th, and 10th rows of the radula of this embryo.

Operculum very small, oval or slightly triangularly ovoid, 4·5 × 2·5 mm. in shell 60 mm. with 28 mm. aperture.

Cream or ochraceous, protoconch and apical whorls often with a livery tinge; operculum amber.

Foot with antero-lateral corners very shortly pointed, posterior tails small, no eyes. Radula with 75–85 rows, central plate $1\frac{1}{4}$ times as wide as lateral plate, its base 3–$3\frac{1}{2}$ times as wide as long, with 9 cusps and a denticle externally on one or both sides; lateral plate with inner cusp bifurcate, outer prong with 1–3 denticles or serrulations on its outer edge.

Animal purplish-grey or flesh-coloured, edge of foot pale.

Four egg-capsules were taken by U.C.T. in False Bay on 29 July 1952. They are thin and membranous, soft, transparent, with an attachment thread at each end, one of the threads being less coiled than the other on all four capsules. One capsule contained numerous eggs, *c.* 0·2 mm. diam.; the others only one shell each.

Shell 5·3 × 3·5 mm., aperture 3·3 mm., operculum 0·75 × 0·5 mm.

Radula with 38 rows, central plate of 1st row with 3 cusps, of 5th row with 5 cusps, of 10th row with 7 cusps, thereafter from about the 12th row with 9 cusps; inner cusp of the lateral plate of the first two or three rows simple, thereafter bifurcate, sometimes trifurcate.

False Bay to Port Alfred (auct.). Port Natal (Durban) (von Martens, coll. Heynemann in Berlin Mus.).

Living: Algoa Bay (von Martens); False Bay and Mossel Bay (U.C.T.); False Bay to off Great Fish Point and Port Alfred, 9–66 fathoms (S. Afr. Mus. P.F. coll.); 33° 47′ S. 26° E., 26 fathoms, and 33° S. 28° 11′ E., 31 fathoms (U.C.T.).

Remarks. The ridge-like callus on 3rd and 4th whorls is distinctive.

There are plump and slender forms, e.g. 31 × 16 and 34 × 15 mm., 47 × 25 and 50 × 23 mm. One specimen is slightly turreted owing to a small rounded shoulder below the suture on the later whorls.

B. lara Bartsch is probably synonymous, though it is said (by Turton) to lack the callus ridge, and (as far as can be judged from Bartsch's figure) the columellar glaze is not nearly so extensive.

Haughton (1932. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 47, pl. 5, fig. 2) has recorded this species, identified by Tomlin, from Quaternary raised beaches near the mouths of the Orange River and Olifants River. The figure shows a shell shaped more like *digitalis* than *tenuis*; and on the west coast the occurrence of *tenuis* seems rather unlikely.

Bullia pura Melv.

Figs. 25(*a*), 27(*c*)

1885. Melvill. *J. Conch.*, iv, p. 316.
1921. Sowerby. *Proc. Mal. Soc.*, xiv, p. 127 (var. *balteata*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 430.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 61, pl. 14, no. 447, and var. *balteata*, p. 61, pl.14, no. 448.
1932. id. ibid., p. 61, pl. 14, no. 449 (*kraussi*).
1937. Peile. loc. cit., p. 184, fig. 18 (radula).

Aperture 1¼–1½ times in spire. Apical whorl (protoconch) diam. 0·5 mm. Whorls (total) 9 (10); profile of shell from apex to body whorl slightly concave. Parietal callus thin, not visible above suture except on last whorl (or last part of last whorl), where it extends only a short distance ⅛–⅐ on to preceding whorl, but just before and at the aperture it spreads out slightly to ¼ length of preceding

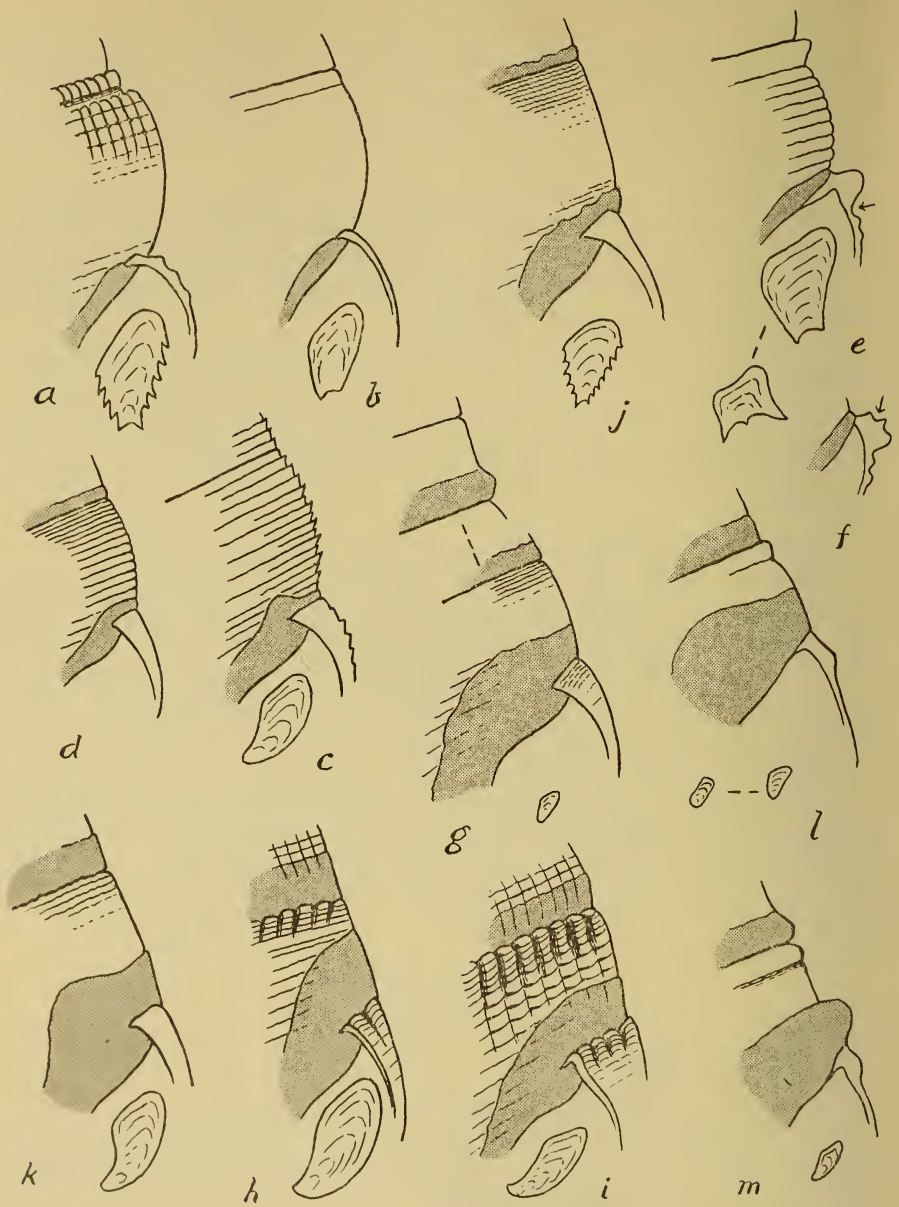

FIG. 27.

Portions of penultimate and ultimate whorls, and aperture of *Bullia* to show parietal callus (stippled) and sculpture. Opercula included when known. (*a*) *similis* Sow. (*b*) *osculata* (Sow.). (*c*) *pura* Melv. (*d*) *diluta* (Krss.). (*e*) *annulata* (Lam.) Rve., with operculum of juvenile. (*f*) *trifasciata* Smith, posterior part of aperture. (*g*) *tenuis* Gray, with 3rd whorl above. (*h*) *natalensis* (Krss.). (*i*) *mozambicensis* Smith. (*j*) *digitalis* Meuschen. (*k*) *rhodostoma* Rve. (*l*) *laevissima* (Gmelin), with variant of operculum. (*m*) *callosa* (Gray) Rve.

whorl above the suture. First 2 (2½) whorls smooth; on 3rd and following whorls 7–9 spiral lirae, on the later whorls often with intermediaries, 5—6 (7) additional lirae on base, also sometimes with 2–3 intermediaries. Columellar glaze thin, spreading slightly above posterior canal, covering rostrum but not more than about ⅓ of base. 33 × 13 mm., smallest example seen 1·75 × 1 mm. (3 whorls). Turton: 35 mm.

Operculum ovate, apex incurved, a slight sigmoid ridge or thickening on inner surface near inner (left) margin, margins smooth, 4·5 × 2·75 mm. in shell 22 mm. with 13·5 mm. aperture.

Cream or buff, sometimes with a white band below suture (*balteata*), sometimes with irregular faint brown marks around periphery of last whorl or last two whorls; operculum amber.

Radula with *c.* 60 (half-grown)–75 rows, central plate about 1⅓ times as wide as lateral plate, its base 4½–5 times as wide as long, with 10 rather stout and bluntish cusps (throughout the radula, not only the anterior ones which get blunted by wear); lateral plate with inner cusp stout, bifurcate, inner prong broad with sinuous inner margin, outer prong slender.

Fossil: raised beaches at Keurbooms River estuary (K.H.B. 1931).

Dead: Port Alfred and Port Elizabeth (Sowerby, Bartsch, Turton). Still Bay (S. Afr. Mus. coll. Muir).

Living: False Bay (S. Afr. Mus.).

Remarks. The tapering spire due to the slenderness of the early whorls contrasted with the rather disproportionate width of the last whorl, producing the concave profile of the shell as a whole, is distinctive.

The shape of the inner cusp of the lateral plate of the radula is, so far as is known, unique among the South African species.

B. tenuistriata Tomlin (*supra* p. 127) is probably synonymous, based on examples in which the intermediary lirae are specially well developed and the sutures abnormally sunken.

Bullia diluta (Krss.)

Fig. 27(*d*)

1848. Krauss. *Südafrik. Moll.*, p. 121 (*Buccinum d.*).
1874. Von Martens. *Jahrb. D. Malak. Ges.*, i, p. 137, pl. 6, fig. 4 (var. *mediolaevis*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 53, pl. 35, fig. 5 (*aepynota*, subturriform).
1915. id. ibid., p. 54, pl. 3, fig. 2 (*alfredensis*).

Probable other synonyms are Turton's: *albanyana* (subturriform), *rietensis*, *zenobia*, *subventricosa* (subturriform), *spectrum*, *scitula*.

Aperture 1⅔–1¾ (half-grown) to 2 times in spire. Angle of spire 20°–25°. Apical whorl (protoconch) diam. 0·75 mm. Whorls (total) 9. Profile of whole shell straight. Parietal callus thin, extending up ⅙–⅐ of length of preceding whorl and visible from (5th) 6th whorl onwards (best seen in worn specimens!). Spiral striae over whole whorl from 3rd whorl onwards, *c.* 15 on last whorl, but often with fine intermediaries, striae closer together on upper part of

whorl; 5–6 additional spaced striae on base. Columellar glaze thin, not extensive, not covering rostrum. 29 × 10 mm.

Operculum and animal unknown.

Cream or fawn, with a series of orange-brown spots in upper third of whorls, continued downwards as axial streaks (as if the spot of colour had 'run'), the costa on base from columella to end of aperture orange-brown, sometimes showing through at the suture of following whorl, the ground-colour above the spots often paler (whitish) than the lower part of whorls.

Natal (Krauss); Port Elizabeth (Sowerby, Bartsch); Port Alfred (Bartsch, Turton). Port Alfred, East London, Port St. Johns, Scottburgh (Natal), Durban, Tongaat (30 miles N. of Durban) (S. Afr. Mus.). Delagoa Bay (U.W.).

False Bay (von Martens: var. *mediolaevis*).

Remarks. A common species with several minor variations in coloration and convexity of the whorls, sometimes subturriform (*aepynota*, *subventricosa*, *scitula*), which have been given names as distinct species.

The specimens described by von Martens as var. *mediolaevis* from the Fritsch collection were stated to have come from False Bay. But there is no other record from any locality west of Algoa Bay; perhaps Dr. Fritsch obtained the specimen from a friend.

Bullia natalensis (Krss.)

Figs. 25(*c*), 27(*h*), 28

1848. Krauss. *Südafrik. Moll.*, p. 121, pl. 6, fig. 16 (*Buccinum n.*).

Aperture $1\frac{1}{4}$—$1\frac{1}{3}$ in spire. Diameter of protoconch 0·5, of 1st whorl 1·25, of 2nd 1·5, of 3rd 1·75 mm. Whorls (total) 8. Profile straight, slightly concave near apex. Parietal callus thin, visible but very narrow on 3rd whorl, on 4th extending up $\frac{1}{5}$–$\frac{1}{4}$ length of preceding whorl, on 5th $\frac{1}{3}$, on 6th $\frac{1}{2}$, and on 7th and 8th $\frac{2}{3}$. First 3 whorls smooth; fine axial slightly curved plicae on 4th and 5th, somewhat irregular, becoming stronger on later whorls, where they form a strong crenulation at the suture, but obsolescent on middle and lower part of whorl, about 22 on last whorl. Spiral striae on 4th and following whorls, about 13 on 4th whorl, 15 on 5th, closer together at top of whorl, on later whorls less conspicuous and concealed by the increasing width of the callus, 3–4 additional inconspicuous striae on base. Columella evenly curved, without keel or bend; glaze thin, covering about $\frac{1}{3}$–$\frac{1}{2}$ base. 34 × 13 mm. (8 whorls). A larger specimen 41 × 17 mm. (apex worn, 4 whorls remaining, probably 43–44 mm. long when perfect).

Operculum nearly filling aperture, ovate, apex incurved, margins smooth, 5 × 2·5 mm. in shell 15 mm. with 6 mm. aperture.

Cream or flesh-coloured, sometimes slightly livid in middle of whorl, basal costa yellowish, aperture orange within, pale at margin of outer lip, operculum amber.

Foot with antero-lateral corners shortly pointed, posteriorly with 2 tails, no eyes. Radula with 55 (14 mm. shell)–65 rows, central plate slightly wider than lateral plate, its base 3–3½ times as wide as long, with 9–10 cusps; lateral plate with inner cusp bifurcate, the outer prong smaller and more slender than the inner (median) prong. Animal pale flesh-colour.

Fossil: raised beach, alt. 375 ft. Durban-Umgeni (Geol. Survey).

Dead: Durban (Krauss). Durban and Tongaat (S. Afr. Mus.).

Living: Durban (S. Afr. Mus. coll. K.H.B.); Umhlali and Karridene (Natal) (U.C.T.), Delagoa Bay (U.W.).

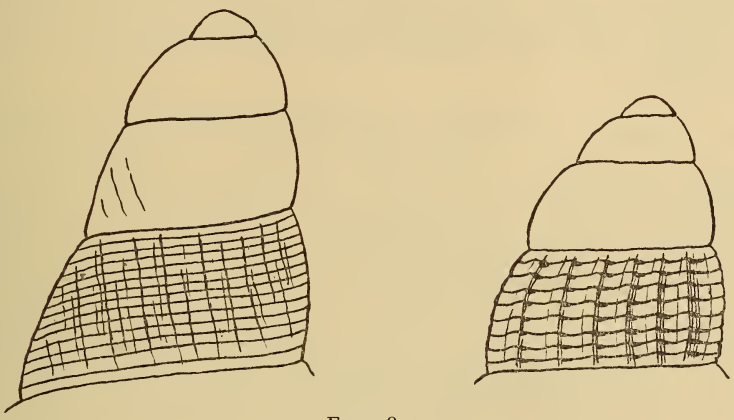

Fig. 28.

Protoconch and upper whorls of (*left*) *Bullia natalensis* (Krss.), and (*right*) *B. mozambicensis* Smith. Length of portion figured 3 mm. and 2 mm. respectively.

Remarks. Distinguished from *mozambicensis* by the apical three smooth whorls being more elongate and papilliform, and by the sculpture of the early whorls being cancellate but not pustulose, and by the lack of spiral striae on base of last whorl. The operculum very nearly fills the aperture, and relatively is larger than in any other South African species.

The parietal callus band is also, relatively, wider than in other South African species.

This species does not, according to the few records, occur south of Durban.

Aberr. gigant. In S. Afr. Mus. (ex coll. Ross-Frames) is one very large shell said to have come from the mouth of the Limpopo River (Chai Chai, Portuguese East Africa), together with one undoubted *mozambicensis*. It measures 60 × 24 mm.; 6 whorls remain, the apex is worn and 2, possibly 3, whorls are missing. It agrees in sculpture and shape of columella with *natalensis*. The parietal callus extends only ⅓ in the 2nd remaining whorl, but rapidly widens to ½ on the 3rd and equally rapidly to ⅘ on the 4th, leaving only the sutural crenulations exposed; near the end of the 4th whorl it drops abruptly to ⅓ on 5th, and continues thus on the 6th.

The sutural diameter of the 8th whorl of the 34 mm. shell is 10 mm.; if the 41 mm. shell (recorded above) be assumed to have had 8½ whorls the diameter of the 8th whorl is also 10 mm.; and the diameter of the 8½th of this 41 mm. shell is approximately the same (12 mm.) as that of the assumed 8½th whorl of the giant 60 mm. shell. The latter may therefore be reasonably assumed to have had originally 9, possibly 9½, whorls.

Until connecting sizes are found this 'outsize' shell may be regarded as an example of gigantism.

Recently an even larger shell has come to hand, collected by Dr. L. Kent (Geological Survey) somewhere between Port Shepstone and Durban. It measures 65 × 26 mm.; only 4½ whorls remain, the 3½ or 4½ apical whorls being missing. The callus on the last two whorls occupies one half of the preceding whorl.

Bullia mozambicensis Smith

Figs. 25(*d*), 27(*i*), 28

1877. Smith. *Proc. Zool. Soc. Lond.*, p. 719, pl. 75, fig. 18 (not good).
1894. Sowerby. *J. Conch.*, vii, p. 368 (*pustulosa*).
1897. id. *Append. Mar. Sh. S. Afr.*, p. 5, pl. 6, fig. 1 (*pustulosa*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 430.

Aperture 1¼ (–1⅓) in spire. Diameter of protoconch 0·5, of 1st whorl 0·75, of 2nd 1·5, and of 3rd 1·75 mm. Whorls (total) 9. Profile straight, slightly concave near apex. Parietal callus thin, very narrow on 4th whorl, on 5th extending up ¼–⅓ length of preceding whorl, on 6th–9th whorls up to ½ or nearly ½, never exceeding ½. First three whorls smooth; close-set regular slightly curved axial plicae on 4th and following whorls, from suture to suture on early whorls, but on (7th) 8th and 9th becoming obsolete on middle and lower part of whorl, forming a strong crenulation at the suture, *c.* 22 on 4th, 30–32 on 5th and later whorls, but becoming irregular and more or less coalescent on 8th and 9th whorls. Spiral striae 8–9 on 4th and following whorls, 9–10 on 9th whorl, deep, cutting the axial plicae into conspicuous pustules on 4th–7th whorls (not well shown in Smith's figure), but on 8th the pustules are flattened and the sculpture consequently only cancellate, middle and lower part of 9th whorl with only spiral striae; 4–5 additional striae on base; the pustules and striae on the lower part of the whorls not completely concealed by the callus. Columella with a somewhat pronounced bend at the anterior canal; glaze thin, covering not more than ⅓ of base. 43 × 18 mm.

Operculum not filling aperture, ovate, apex incurved, margins smooth, 6·5 × 3 mm. in 31 mm. shell with 13 mm. aperture.

Cream or flesh-coloured, sometimes slightly livid on middle of whorls, aperture orange within but pale at margin of outer lip, operculum amber.

Foot with antero-lateral corners shortly pointed, posteriorly with 2 tails, no eyes. Radula with 80 rows, central plate 1⅓–1½ times as wide as lateral plate, its base about 4 times as wide as long, with 11–12 (13) cusps, lateral

plate with inner cusp bifurcate, outer prong more slender than inner prong.

Animal pale greyish-buff.

Dead: Quelimane (Smith); Durban (Sowerby); Durban and Tongaat (S. Afr. Mus.); mouth of Limpopo Ruver (Chai Chai, Portuguese East Africa) (S. Afr. Mus. coll. Ross-Frames).

Living: Chinde, mouth of Zambesi River (S. Afr. Mus. coll. K.H.B.).

Remarks. The differences between this species and *natalensis* have been given above. The length of the first three whorls is here less, and the shape therefore more mamilliform.

Bullia digitalis Meuschen

Figs. 25(*e*), 27(*j*), 29

1787. Meuschen. *Mus. Gevers.*, p. 296.
1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 400, figs. 4 *a*, *b*, and Liste, p. 2 (*Buccinum achatinum*, nom. et fig.).
1846. Reeve. *Conch. Icon.*, iii, Bullia sp. 4, pl. 4 (*digitale*), sp. 14 (*sulcata*), sp. 17 (*semiflammea*).
1847. id. ibid., sp. 22 (*semiusta*).
1885. Euthyme. *Bull. Soc. malac. Fr.*, ii, p. 237 (*capensis*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 53 (*digitata* [*sic*] *et alia*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 54, pl. 35, fig. 4 (*almo*).
1921. Sowerby. *Proc. Mal. Soc.*, xiv, p. 125, text-fig. (*dulcis*).
1922. Tomlin. *J. Conch.*, xvi, p. 260.
1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, 7, p. 6.
1932. Turton. *Mar. Sh. Pt. Alfred*, pp. 65, 66, pl. 15 (*digitalis* and vars.).
1932. id. ibid., p. 65, pl. 15, no. 470 (*soluta* Gmelin, subscalariform).
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 22.
1937. Peile. loc. cit., p. 184 (radula) (*achatina*).

Aperture $1\frac{1}{2}$–$1\frac{2}{3}$ (ocasionally 2) times in spire. Angle of spire 30°–35°. Apical whorl (protoconch) diam. 0·6 mm. Whorls (total) 10. Profile of whole shell straight. Parietal callus thin, visible from 4th whorl, extending up about $\frac{1}{6}$ length of preceding whorl. Spiral striae from 3rd whorl onwards over whole whorl, but often indistinct and obsolescent on middle and lower part of whorls, very fine, close together, minutely crinkly due to intersection with the fine growth-lines; 5–6 additional stronger and widely spaced striae on base. Columellar glaze thin, extending over about half base. 52 × 21 mm., smallest examined 4 × 1·75 mm.

Operculum triangular, both margins strongly serrate, but often worn nearly smooth, apex narrow, concave between two little points, 6 × 3·75 mm. in 45 mm. shell with 16 mm. aperture.

Variously coloured: uniform cream, fawn, brown (*achatina*), sometimes with livery tinge (*sulcata*), plumbeous or violaceous; upper half of whorls cream, lower half brown (*semiusta*); cream with a peripheral series of orange-brown spots which extend downwards (as if the colour had 'run') as axial streaks and flames (*semi-flammea*, *dulcis*), sometimes the spots are absent and the axial streaks may be separate and distinct, or they may be coalescent into a more or less solid band, thus approaching the *semiusta* pattern; the apex is usually white,

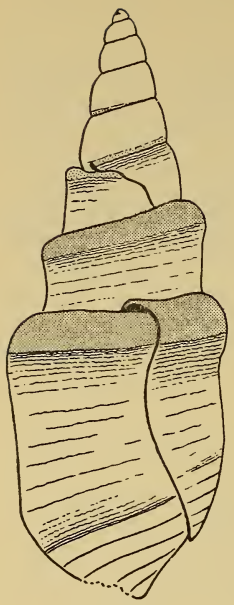

Fig. 29.
Bullia digitalis Meuschen. 14 mm. specimen from Still Bay to show abnormal development of callus after injury, producing an *annulata*-like shoulder. Callus stippled.

even in *achatina*; sometimes the early whorls may be brown with the later ones becoming gradually uniform cream. Operculum amber.

Foot with antero-lateral corners acute, posteriorly with 2 tails, no eyes. Radula with 75–85 rows, central plate about 1½ times wider than lateral plate, its base nearly 4 times as wide as long, with 15–17 cusps, and often a minute denticle externally on one or both sides, lateral plate with inner cusp bifurcate, outer prong smaller than the inner prong.

Animal pale flesh-coloured, foot sometimes plumbeous or violaceous.

Fossil, Quaternary: Angra Junta, South West Africa (Haughton).

Dead: Angra Pequena (Lüderitzbucht), Olifants River mouth, False Bay, Port Elizabeth, Port Alfred (auct). Table Bay, Plettenberg Bay (S. Afr. Mus.). Off Cape Morgan, 36 fathoms (S. Afr. Mus. P.F. coll.).

Living: False Bay, littoral and 9 fathoms, Port Elizabeth, littoral (S. Afr. Mus.); Hydra Bay (Danger Point) (Odhner, presumably living); Saldanha Bay and Lambert's Bay, 15 metres (U.C.T.).

Remarks. The earlier records from Lüderitzbucht might have been open to doubt, but have been confirmed by Tomlin (1922). The Olifants River, Lambert's Bay and Saldanha Bay records connect with Table Bay, but there is a considerable gap between the first mentioned and Lüderitzbucht. The species has not been reported from Port Nolloth. At Lambert's Bay U.C.T. found it at 15 metres depth, but not on shore.

Examples with the *semiflammea-dulcis* colour pattern are liable to be confused with *diluta*, but may be distinguished by the shorter spire relatively to the aperture, and the fine spiral striae.

Subscalariform aberr. (fig. 29). A 14 mm. specimen (Still Bay, coll. Muir) has the first 5 whorls normal, but the following two with well-marked shoulders. Below the shoulder the profile of both whorls is straight, and thus the width of the last whorl (5·5 mm.) is scarcely greater than that of an equal-sized normal example. The 4th and 5th whorls show the peripheral series of spots, but the last 2 whorls are uniform cream.

The change to shouldered whorls was caused by an injury. Instead of the parietal callus being plastered as a thin layer against the preceding whorl, only its edge adjoins the preceding whorl (forming a 'false' suture), the rest of the layer projects outwards forming the shoulder. A later, less severe injury has resulted only in an irregular joint, without further upsetting the animal's organization.

Bullia rhodostoma (Gray MS.) Rve.

Figs. 25(*g*), 27(*k*)

1847. Reeve. *Conch. Icon.*, iii, Bullia no. 25.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 55 (*polita* ? non Lam.).
1937. Peile. loc. cit., p. 184 (radula).

Aperture $1\frac{1}{3}$–$1\frac{1}{4}$ times longer than spire (juv.), subequal to spire (half-grown), $1\frac{1}{4}$ in spire (fully grown). Angle of spire *c.* 40°. Apical whorl (protoconch) diam. 0·75 mm. Whorls (total) 9. Parietal callus thin, visible from 3rd whorl, extending up $\frac{1}{3}$, sometimes almost $\frac{1}{2}$ length of preceding whorl. Spiral striae from 3rd whorl onwards, over whole whorl on 3rd and 4th but on later whorls confined to upper part, obsolescent on middle and lower parts, even on the upper part rarely more than half-a-dozen very fine striae, often indistinct or obsolete, no additional striae or only very fine and indistinct ones on base (see Remarks); growth-lines may produce a fine minute crinkling at the sutures. Columellar glaze thin, extending at most only halfway across base. 47 × 19 mm., smallest examined 4 × 2·75 mm.

Operculum ovate, apex incurved, margins smooth, 9 × 3·75 mm. in 39 and 41 mm. shells with apertures 17–18 mm.

Cream or flesh-coloured, lower part of whorls sometimes darker, sometimes paler, due to the parietal callus, costa on base orange, aperture deep orange within but paler at margin of outer lip, varices (if present) yellow or orange; operculum amber.

Foot with antero-lateral corners shortly pointed, posteriorly with 2 tails, no eyes. Radula with 55–60 rows (40–45 in 17 mm. shells), central plate only a little wider than lateral plate, its base about 3 times as wide as long, with 11–13 cusps, often a minute denticle externally on one side or the other, lateral plate usually with 2 smaller cusps on the outer margin of its inner cusp, on one side sometimes with only one, sometimes with 3 (cf. Peile).

Animal pale greyish or flesh-coloured.

Dead: Port Elizabeth, Port Alfred (Sowerby, Bartsch, Turton). Pringle Bay (east side of False Bay), and Still Bay (S. Afr. Mus.).

Living: False Bay, littoral; Mossel Bay; Port Elizabeth, littoral; Durban, littoral (S. Afr. Mus.). Delagoa Bay (U.W.).

Remarks. The Durban specimens conform with the above description in all respects, including the animal with its radula, but the spiral striae are more distinct than in the majority of examples from farther west; in one specimen 29 mm. long there are about 20 striae on the upper part of the last (8th) whorl and 8–10 at bottom of base; the largest specimen 33 mm. also with 8 whorls, has fewer striae above but more below, and faint traces of striae in the middle of the whorl.

I have seen only one juvenile from Delagoa Bay, but the radula agrees.

In the Pringle Bay specimens the outer lip at irregular intervals has been thickened to form a varix; in one specimen one varix on penultimate whorl

and about 10 on last whorl, the latest-formed 4–5 close together; in another specimen one varix on penultimate whorl and 4 on last; three others have 1–4 varices on the last whorl only; one other specimen has only one feeble varix near margin of outer lip. Specimens from other localities very rarely produce varices.

The specimen which Bartsch referred to '*polita* Lam.' is probably a *rhodostoma*. (The West African *polita* Lam. = *miran* Brug. is a *Dorsanum*, see Dautzenberg 1910.)

Bullia laevissima (Gmelin)

Figs. 25(*h*), 27(*l*)

1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 400, figs. 1 *a*, *b*, and Liste, p. 2 (*Buccinum laevigatum*, nom. et fig.).
1886. Watson. *Challenger Rep.*, xv, p. 190 (*laevigata*) (references).
1903. Von Martens *D. Tiefsee Exp.*, vii, pp. 29, 53 (*laevigata*).
1922. Tomlin. *J. Conch.*, xvi, p. 260.
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), pp. 22, 46, pl. 5, fig. 3.
1932. Gevers. ibid., p. 74.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 66, pl. 16, no. 482 (juv.), and var. *globulosa*.
1937. Peile. loc. cit., p. 184, fig. 19 (radula) (*Leiodomus l.*).

Aperture at first subequal to spire, but at an early stage becoming longer than spire, in adult spire 1½ in aperture. Apical whorl (protoconch) diam. 0·75 mm. Whorls (total) 7, perhaps 8, broadening rapidly from 3rd or 4th whorl onwards. Parietal callus thick, intervening between suture and preceding whorl, and extending up about ⅓ length on 4th whorl (sometimes beginning to show on 3rd), increasing to ½, often to ⅔ or even ¾ length of preceding whorl in large shells. On 2nd whorl a spiral stria at top of whorl, becoming a sulcus on 3rd, rather broad but shallow on 4th and 5th whorls, but narrowing and obsolescent on 6th, on 7th only a slight indentation below the rounded shoulder; 2–3 (sometimes 4) striae on lower part of base in juveniles, but in older examples only the lowermost one persisting, and that one obsolete in very large shells (over 35 mm. long). Columellar glaze thick and extending over whole base. 55 × 34 mm., another with worn apex 57 mm. long; Tryon gives 75 mm.; smallest specimen examined 4·25 × 2·75 mm.

Operculum very small, subtriangular (similar to that of *annulata* but much smaller), or narrow oval or cuneiform, apex truncate, margins smooth, 5 × 4 mm. or 5 × 2 mm. in 42 mm. shells with 25 mm. apertures, and 4·5 × 2·5 mm. in 55 mm. shell with 35 mm. aperture.

Cream, fawn, or greyish, with 2–3 faint spiral darker bands, the band near the suture more visible than the other(s); columella suffused with pink or madder-brown; operculum amber-brown.

Foot with antero-lateral corners very shortly pointed, posteriorly with 2 small tails, no eyes. Radula with *c.* 80 rows, central plate 1⅓–1½ times as wide as lateral plate, its base 4–4½ times as wide as long, with (18) 19–22 cusps, often a minute denticle externally, lateral plate with inner cusp bifurcate,

symmetrical, or the outer prong bifurcate on one side, or bifurcate on one side and trifurcate on the other (cf. Peile).

Animal purplish-brown or livery-pink, edge of foot pale.

Fossil, Quaternary: Bogenfels and Angra Junta, South West Africa (Haughton); Sedgefield near Knysna (Martin); Recent: Cape Cross salt-pan, South West Africa (Gevers).

Dead: Lüderitzbucht, Olifants River mouth, Table Bay, False Bay, Algoa Bay, Port Alfred (auct.).

Living: Simon's Bay (False Bay), 15–20 fathoms (Watson). Saldanha Bay, 10–14 fathoms; Table Bay; False Bay, 10–22 fathoms, Mossel Bay and off Cape St. Blaize, 17–19 fathoms (S. Afr. Mus. P.F. coll.). Lambert's Bay, 15 metres; Saldanha Bay, False Bay and Algoa Bay (U.C.T); 34° S 25° 46′ E., 41 fathoms (U.C.T.).

Remarks. Smith (1903) said *laevigata* Chemn. was not published by a binomial writer, but Watson (1886) quotes '*Buccinum laevigatum*' Chemn. 1780, with full reference, and *laevissima* Gmelin 1790.

This is the only South African species in which the aperture exceeds the spire in length (except in very juvenile).

Juveniles less than 10 mm. in length are not always distinguishable with certainty from those of *annulata*, but are usually proportionately broader and the length of the aperture exceeds that of spire.

Bullia callosa (Gray) Rve.

Fig. 27(*m*)

1828. Gray in Wood. *Suppl. Ind. Test.*, p. 12, pl. 4, fig. 14 (*Buccinum c.*) (*fide* Dautzenberg, 1912. Sherborn, *Ind. Anim.*, says nom. et fig.).
? 1839. Gray. *Zool. of the* '*Blossom*', p. 127 (*semiplicata*).
1847. Reeve. *Conch. Icon.*, iii, Bullia sp. 24.
? 1884. Fischer. *Man. Conchyl.*, p. 636, pl. 5, fig. 4 (*Buccinanops semiplicata* Gray).
1889. Sowerby. *J. Conch.*, vi, p. 6 (var. *sulcata*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 53.
1912. Dautzenberg. *Ann. Inst. ocean.*, vol. v, fasc. 3, p. 34 (*Dorsanum c.*).
1932. Gevers. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 74.

Aperture subequal to spire. Apical whorl (protoconch) diam, 0·75 mm. Whorls (total) 7, turreted (pagoda-like), profile straight, at least on later whorls. Parietal callus thick, often very thick, intervening between suture and preceding whorl, and extending up about $\frac{1}{3}$ length, when strongly developed extending not farther upwards but outwards to form a rounded shoulder above the suture of following whorl. On 3rd whorl a spiral stria at top of whorl (sometimes traceable on later part of 2nd whorl) becoming on 4th and later whorls a sulcus followed by a stria, sometimes 2–3 additional striae traceable but rarely distinct, 4–5 additional ones on base. Columellar glaze thick and extending over whole base. 37 × 19 mm. (worn); Turton: 45 mm. long. Smallest specimen examined 3 × 1·75 mm.

Operculum small, narrow triangularly ovate, margins smooth, 5·5 × 2·5 mm. in 35 mm. shell with 20 mm. aperture.

Brown or purplish-brown, the callus band darker, operculum amber. Beach specimens cream, fawn or pale brown, the callus forming a brown spiral band and a brown patch on base.

Foot with antero-lateral corners shortly pointed, posteriorly with 2 small tails, no eyes. Radula with *c.* 90 rows, central plate 1½ times as wide as lateral plate, its base about 2½ times as wide as long, with 13–15 cusps; lateral plate with inner cusp bifurcate, outer prong more slender than the inner (only one radula available).

Animal purplish-brown, sole darker than upper part of foot.

Fossil, Recent: Cape Cross salt-pan, South West Africa (Gevers).

Dead: Lüderitzbucht, Port Elizabeth, Port Alfred (von Martens, Sowerby, Turton). Still Bay (S. Afr. Mus. coll. Muir); Durban and Tongaat (30 miles N. of Durban) (S. Afr. Mus.).

Living: Mossel Bay and off Cape St. Blaize, 17 fathoms (S. Afr. Mus. P.F. coll.). Algoa Bay (U.C.T.).

Distribution. Mossamedes, 15–20 metres (Dautzenberg).

Remarks. Juveniles 7–8 mm. long (5 whorls) usually, and 5 mm. long (4 whorls) sometimes, are recognizable by the brown callus band; smaller examples in which the callus is as pale as rest of shell are very similar to juveniles of *annulata* but narrower.

The Durban and Tongaat examples—up to 38 mm. long—show the subsutural sulcus and 3–4 striae very clearly (var. *sulcata*), except on the last (7th) whorl of the largest specimen

On the south coast this species has not been recorded from farther west than Still Bay, not even from False Bay. There is therefore a big gap in the distribution until one comes to Lüderitzbucht and Cape Cross on the west coast, and farther north Mossamedes.

Presumably the south and west coast examples are conspecific. Live specimens from the west coast would be useful for comparison, because the South African *callosa* is a true *Bullia*, i.e. without eyes and with two tails, not a *Dorsanum* as defined by Thiele (1929).

Gen. *Adinopsis* Odhner

1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, 7, p. 15.
1929. Thiele. *Handbuch*, i, p. 740 (addenda).
1937. Peile. *Proc. Mal. Soc.*, xxii, p. 186 (radula).

Shell in general resembling *Bullia*, profile slightly concave, apex blunt, no parietal callus, columellar glaze narrow, outer lip plicate within.

Operculum apex incurved, margins smooth.

Animal with eyes, foot with 2 tails posteriorly. Radula lateral plate with 2 cusps, the inner one not bifurcate.

Adinopsis skoogi Odhner

1923. Odhner. loc. cit., p. 15, pl. 1, figs. 11–14.
1937. Peile. loc. cit., p. 186, fig. 24 (radula).

Length 25 mm. Brown with two pale spiral bands.
Port Alexander, Angola, 16 fathoms.

Fam. *VOLEMIDAE*

1929. Thiele. *Handbuch*, i, p. 319 (*Galeodidae*).
1952. Bayer. *Zool. Med.*, xxxi, no. 25, p. 265.

If *Volema* Bolten-Röding 1798 is admitted as a valid genus, the family name should be *Volemidae*. Bayer pointed out that *Galeodes* Bolten-Röding is preoccupied, and therefore adopted *Melongena*. He included as a section of this genus the earlier *Volema*; it would seem more correct to make *Volema* the genus, with sections *Volema* s.s. and *Melongena*.

Gen. Volema Bolten-Röding

1798. Bolten-Röding. *Mus. Bolten.* (2), p. 57.
1817. Schumacher. *Essai . . . vers testacés*, pp. 64, 212.
1929. Thiele. loc. cit., p. 320 (*Galeodes*, non Olivier, 1791).
1952. Bayer. loc. cit., p. 265 (*Malongena*).

Volema paradisaica (Martini-Reeve)

Fig. 30(*a*), (*b*)

1777. Martini. *Syst. Conch. Cab.*, iii, p. 202, figs. (full reference in Bayer) (*Pyrum p.*).
1790. Gmelin. *Linn. Syst. Nat.*, ed. 13, p. 3484, no. 56 (*Buccinum pyrum*).
1847. Reeve. *Conch. Icon.*, iv, Pyrula, no. 17.
1933. Krige. *Tr. Geol. Soc. S. Afr.*, xxxv (1932), p. 52.
1952. Bayer. loc. cit., p. 276 (*pirum*, [*sic*]).
1952. Braga. *Anais J. Invest. Ultramar.*, vii, 3, p. 73, pl. 2, fig. 4 (*Melongena p.*).

Protoconch 2 whorls, diam. 1·3, alt. 1·5 mm., smooth, with a few feeble plicae before the not sharply defined junction with 1st postnatal whorl; the latter with 10–11 peripheral knobs.

Radula with *c.* 120 rows, central plate longer than wide, anteriorly concave, posteriorly convex, outer cusp as long as basal plate, middle cusp much smaller; lateral plate as wide as length of basal plate of central, outer cusp twice as long.

Fossil, raised beach, alt. 375 ft. at Durban-Umgeni (Geol. Survey).

Durban Bay, Delagoa Bay, Mozambique (auct. *vide* Bayer).

Durban Bay, one with periostracum (S. Afr. Mus.); Inhambane, juv. (U.C.T.).

Living: Delagoa Bay (S. Afr. Mus. coll. K.H.B. and U.W.).

Distribution. Red Sea, Zanzibar, Mombasa, Ceylon, East Indies.

Remarks. Bayer gave references to early descriptions.

Sowerby's record from Port Elizabeth can scarcely be based on even a beach specimen, certainly not a living one; it was transported more probably by a collector than by a marine current.

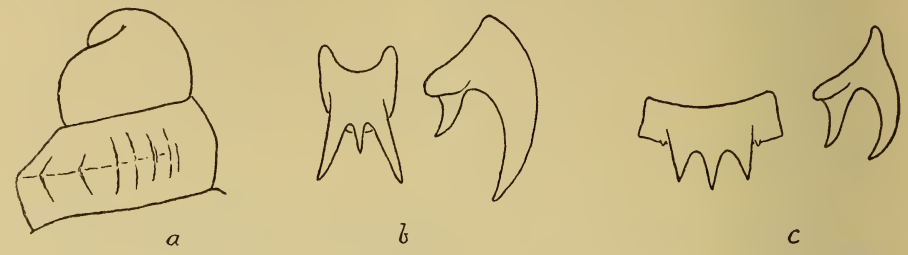

FIG. 30.

(*a*), (*b*) *Volema paradisaica* (Mart. Rve.). Protoconch; central and lateral radula plates. (*c*) *Engina mendicaria* (Linn.) central and lateral radula plates.

Fam. *BUCCINIDAE*

Tomlin (1932) described two species in the genus *Glypteuthria* solely on conchological characters. One of these (*capensis*) has since been shown by the radula to belong to *Fusivoluta*, and the other (*solidissima*) conforms in all essentials with *Afrocominella elongata*. This Antarctic genus, therefore, has no place in the South African fauna-list.

Tomlin (1932) also proposed a new genus *Charitodoron* in this family. One of Tomlin's species is, in my opinion, synonymous with *Columbella agulhasensis* Thiele, which raises the possibility that the genus may be Columbellid, or even Mitrid (see pp. 146 and 51,52).

The P.F. obtained no examples of the genera *Phos*. *Metula*, or *Pisania*, and these genera are not discussed here.

A most unlikely species to be found on the Natal coast or off the Cape is the New Zealand *Siphonalia mandarinus* (Duclos), recorded by Krauss (1848) and Studer (1889). The *Gazelle* specimens from off the Cape were probably *Fusivoluta* (see p. 30); and Krauss's specimens probably a *Fasciolaria* (see p. 77).

'Cominella' species. The following species are transferred to Muricid genera: *acutispira* Sow., *fuscopicta* Turton, *puncturata* Sow., *unifasciata* Sow., *wahlbergi* Krss.; *sulcata* Sow. has been transferred to *Daphnella*, and *angusta* Sow. might well be compared with *Mangilia ponsonbyi* (*Turritidae*).

Gen. CHARITODORON Tomlin

1932. Tomlin. *Ann. S. Afr. Mus.*, xxx, p. 164.
1943. id. *J. Conch.*, xxii, p. 50.

Shell fusiform, thin-walled, aperture shorter than spire, whorls with spiral grooves or striae, axial ribs present on early whorls, sometimes feeble, or

entirely absent; no parietal callus, columella straight, canal short and broad, outer lip thin, internally smooth; periostracum thin. Operculum and animal unknown.

Remarks. This genus has been found not only off the Cape, but also in deep water off East London; its occurrence in deep water off the Natal coast, therefore, would not be very surprising. In fact one shell, at first thought to be a *Charitodoron*, was recently found while searching through the P.F. bottom-samples.

This 4-whorled shell would have been referred to *C. pasithea* in spite of the remoteness of Natal from the type locality of this species, because of its close similarity in measurements with the upper 4 whorls in Tomlin's figure (which is × 2) and its agreement with his description. Fortunately, however, the shell contained the animal, and the radula showed it to be a Mitrid (see *supra*, *Dibaphus*, p. 51).

The remoteness of the two localities thus seems, conversely, to override the conchological similarities, and to be a positive reason for not identifying the Natal shell with *C. pasithea*. At least, until a radula is obtained from an undoubted species of *Charitodoron*, it is safer to leave this genus where Tomlin placed it. Quite possibly it may eventually be removed to the *Columbellidae* in which Thiele described his *agulhasensis* (syn. *aglaia* Tomlin, see p. 146).

Key to species

1. Early whorls cancellate.
   - *a.* Later whorls punctate-striate . . . . . *euphrosyne*
   - *b.* Later whorls smooth . . . . . *agulhasensis*
   - *c.* With deep spiral grooves, cancellate sculpture on last whorl feeble . *pasithea*
2. All whorls with spiral striae only . . . . . *thalia*

Charitodoron euphrosyne Tomlin

1932. Tomlin. loc. cit., p. 167, fig. 8.

Protoconch 2½ whorls, diam. 1, alt. 1·25 mm., smooth. Postnatal whorls 6; (1st corroded) 2nd and 3rd cancellate with axial ribs and spiral lirae, the former gradually petering out on 4th whorl, 5th and 6th whorls with punctate striae only, on 2nd and 3rd whorls 6–7 striae, on 4th 7–9, on 6th 8–10, on base 10–12 (excl. those on rostrum), additional stronger striae becoming deeper and broader grooves. 30 (protoconch missing) × 10 mm.

White with pale yellowish periostracum.

S.W. of Cape Point, 660–700 fathoms (Tomlin); off west coast of Cape Peninsula and south-west of Cape Point, 130-210 fathoms, all dead (S. Afr. Mus. P.F. coll.).

Type in S. Afr. Museum.

Remarks. Only one specimen has a complete protoconch; and in all the specimens corrosion has affected the 1st, and often the 2nd and partly the 3rd whorl. The protoconch appears to have been smooth.

Charitodoron agulhasensis (Thiele)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 173, pl. 30 (18), fig. 20 (*Columbella a.*).
1932. Tomlin. loc. cit., p. 169, fig. 9 (*aglaia*).

Protoconch 2½ whorls, diam. 1 mm., smooth. Postnatal whorls 7 (6 in Type of *aglaia*); 1st and 2nd whorls cancellate with numerous axial ribs and 6 spiral striae; 3rd (and sometimes part of 4th) obscurely punctate-striate; later whorls smooth except for the fine slightly arcuate growth-lines, in some lights 4–6 extremely faint spiral lirae may be visible; base with about 12 (excl. those on rostrum) additional grooves. Type (*aglaia*): 26 × 9 mm., 31 × 10 mm. Type (*agulhasensis*): 17 × 5 mm.

White with pale yellowish periostracum, with indications here and there of slightly darker axial flames.

35° 16′ S. 22° 26′ E., 155 metres (Thiele); exact locality ? (Tomlin). Cape St. Blaize N. × E. distant 73 miles, 125 fathoms; 36° 40′ S. 21° 26′ E., 200 fathoms; off Cove Rock (East London area), 80–130 fathoms; all dead (S. Afr. Mus. P.F. coll.).

Type of *aglaia* in S. Afr. Museum.

Remarks. Tomlin's description says there are 9 whorls, but the Type has only 8 (total), the tip of the protoconch being worn away.

There are three smaller specimens in S. Afr. Mus. from the same haul as the Type. As in *euphrosyne* the apices are corroded.

The Cape St. Blaize specimen is larger than the Type, but is badly corroded, only the apex and body whorl and connecting columella remaining. Protoconch 2½ whorls plus 7 whorls. Periostracum greyish-brown. Six smaller specimens were taken in the same haul.

The Cove Rock specimen, entered in the Museum Register, seems to be missing from the collection.

It is a pity to have to displace Tomlin's specific name, but the synonymy seems clear; a 19 mm. specimen in S. Afr. Mus. corresponds exactly with Thiele's description and figure.

Charitodoron pasithea Tomlin

1943. Tomlin. loc. cit., p. 50, fig.

Protoconch eroded, about 7 postnatal whorls; deep regular spiral grooves, 8 on penultimate whorl, slight arcuate axial ribs on upper whorls, hardly traceable on body whorl. 21 × 8 mm.

Off Cape Point, 430–630 fathoms (Tomlin); same locality, down to 800 fathoms, all dead (S. Afr. Mus. P.F. coll.).

Remarks. Tomlin said all the specimens were in one way or another broken and mended; the figure shows a varix where the shell has been mended.

The above description is abstracted from Tomlin. None of the four registered specimens (Tomlin said: 'several') are in S. Afr. Museum; they are either still in the Tomlin collection, or were lost in transit during the war.

Charitodoron thalia Tomlin

1932. Tomlin. loc. cit., p. 169, fig. 10.

Protoconch 2½ whorls, diam. 1·3 mm., smooth (but worn). Postnatal whorls 5; whorls slightly shouldered (more so in the second specimen than in the Type) immediately below the impressed suture; fine growth-lines, spiral (non-punctate) striae on all whorls, 9 on early whorls increasing to 10–12 on body whorl, *c.* 16 (*c.* 20 incl. those on rostrum) additional stronger grooves on base. 21 × 8 mm.

White with pale cream periostracum.

Off Cape Point, 131 fathoms (Tomlin); off Cape Point, 800-900 fathoms; off Buffalo River (East London area), 310 fathoms; all dead (S. Afr. Mus. P.F. coll.).

Type in S. Afr. Museum.

Remarks. A relatively broader species than either *euphrosyne* or *agulhasensis*.

Although the tip of the protoconch is worn smooth in both examples, I find only 5 postnatal whorls. The protoconch is obviously larger than in *euphrosyne* and *agulhasensis*.

The smaller specimen (not seen by Tomlin) has a small but distinct square shoulder below the suture.

The East London specimen, entered in the Museum Register, seems to be missing from the collection.

Gen. Babylonia Schl.

1822. Lamarck (*Eburna*, non Lamarck, 1801).
1838. Schlüter. *Kurzg. syst. Verz. Conch.*, p. 18.
1929. Thiele. *Handbuch*, i, p. 312 (fig. 344 radula).
1929. id. ibid., p. 332 (*Zemiropsis*, *Olividae*).
1937. Peile. *Proc. Mal. Soc.*, xxii, p. 182 (systematic position).
1953. Kubo & Kondo. *J. Tokyo Univ. Fish.*, xxxix, p. 199, fig. 2 B (age determination based on operculum).
1957. Yoshihara. ibid., xliii, p. 207, pl. 7, figs, C, D (spawning and egg-capsule).

Remarks. Thiele in making a new genus (in the *Olividae*!) for the South African species, evidently had not seen or had overlooked Sowerby's 1902 record and figure. Even without recourse to the radula the species is obviously a *Babylonia*, to which genus Peile restored it.

Babylonia papillaris (Sow.)

Fig. 31(*a*)

1825. Sowerby. *Cat. Tankerville Coll.*, Append., p. xxii (*Eburna p.*).
1833. id. *Conch. Illustr.*, Pt. 20, Eburna, no. 9, fig. (*Eburna p.*).

1902. id. (3rd). *Mar. Invest. S. Afr.*, ii, p. 93, pl. 2, fig. 3 (*Eburna p.*) (shell and animal, operculum badly drawn).
1929. Thiele. loc. cit., p. 332 (*Zemiropsis p.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 31 (*Eburna p.*) and p. 31, pl. 6, no. 229 (*millepunctata*).
1937. Peile. loc. cit., p. 182, fig. 15 (radula).

Protoconch 1½ whorls, diam. at apex 1·5–2 mm., increasing to 2·5–3 mm. Postnatal whorls 5. 47 (to end of columella) 50 (to base of aperture) × 27 mm. Smallest specimen seen 10 mm. long.

Operculum elliptical, concave, nucleus apical, 16 × 7 mm. in 38 mm. shell.

White with reddish or orange-brown spots, varying from moderately numerous (1–2 mm. diam.) to very numerous (0·5 mm. or less) (*millepunctata*); sometimes larger spots near the suture and around base, and forming a central band, small spots on rest of whorl; the large spots near suture usually larger than others and oblique, flame-like; operculum yellowish-amber. Periostracum yellowish.

Animal (as preserved) flesh-coloured; possibly orange when alive.

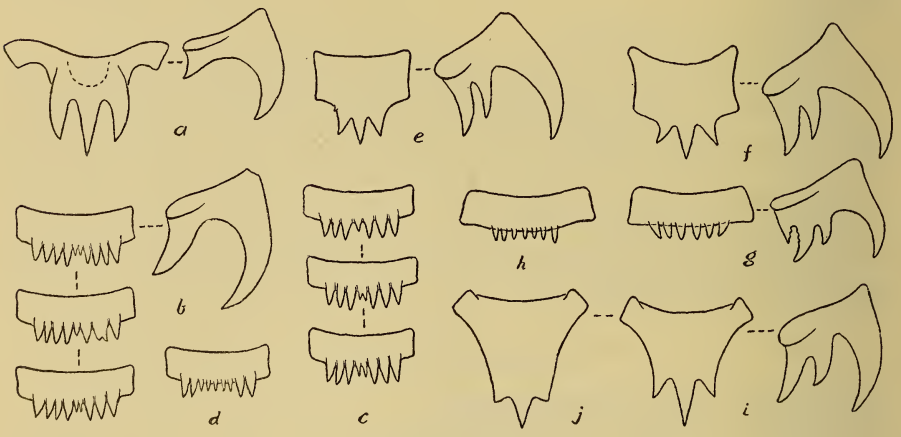

Fig. 31.

Central and lateral radula plates of (*a*) *Babylonia papillaris* (Sow.); (*b*) *Nassaria gracilis* Sow., central plates from front, middle and hind portions of radula; (*c*) the same, from another animal; (*d*) central plate of a Delagoa Bay specimen; (*e*) *Afrocominella capensis* (Dnkr.); (*f*) *A. elongata* (Dnkr.); (*g*) *Burnupena cincta* (Bolten); (*h*) *B. lagenaria* (Lam.), central plate only; (*i*), (*j*) *Euthria queketti* Smith, with malformation of the 77th (from the front) central plate.

Radula with 30 rows (Peile: 36 rows), central and lateral plates as in Thiele's and Peile's figures, middle cusp on central plate a little longer than the others.

Living: Algoa Bay, 24 fathoms (Sowerby, 1902). St. Sebastian Bay, 27 fathoms; Algoa Bay, 10–36 fathoms; off East London, 22–52 fathoms; off Port Shepstone (Natal), 36 fathoms (S. Afr. Mus. P.F. coll.). False Bay (U.C.T.). 34° 01′ S. 25° 45′ E., 25 fathoms (*millepunctata*) (U.C.T.).

Dead: Natal (Smith); Port Alfred (Bartsch, Turton).

Remarks. The type of this species was in the Tankerville collection (now ?); when describing it Sowerby recorded a second specimen then in Broderip's possession (now Brit. Mus.), formerly in the 'African Museum' (Bullock's). Mr. Galbraith of the British Museum informs me that there are two specimens in the B.M., one of which may be a syntype.

Gen. Engina Gray

1839. Gray. *Zool. of the 'Blossom'*, p. 112.
1840. Swainson. *Treat. Malac.*, clii, p. 313 (*Pusiostoma* part).
1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 271 (radula).

Engina perlata (Küster)

1858. Küster. *Conch. Cab.*, p. 61, pl. 12, figs. 5, 6.
1895. Melvill. *Proc. Mal. Soc.*, i, p. 226, pl. 14, fig. 12 (*natalensis*).

Radula as in *mendicaria*, but the external denticles on the central plate are minute or obsolete; *c.* 98 rows.

Living: Durban and Umhlanga (U.C.T.).

Dead: Natal (Küster); Durban (Melvill); Tongaat and Scottburgh (Natal), and Port St. Johns (S. Afr. Mus.).

Engina (*Pusiostoma*) *mendicaria* (Linn.)

Fig. 30(*c*)

1758. Linne. *Syst. Nat.*, ed. 10, p. 731 (*Voluta m.*).
1859. Chenu. *Man. Conchyl.*, i, fig. 1106 (*Columbella m.*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 97 (references).
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 309, pl. 24, fig. 3 (radula).

Radula with *c.* 100 rows, central plate with 3 subequal major cusps, and a small cusp externally on each side, lateral plate with outer cusp considerably larger than the inner.

Living: Kosi Bay (U.C.T.); Delagoa Bay (U.W.); Mozambique Island (S. Afr. Mus. coll. K.H.B., and U.W.).

Distribution. Mauritius, Seychelles, Madagascar; Indo-Pacific.

Engina marmorata (Rve.)

1846. Reeve. *Conch. Icon.*, pl. 12, fig. 95 (*Buccinum m.*).
1848. Krauss. *Südafrik. Moll.*, p. 120 (*Buccinum m.*).
1880. Von Martens. *Mauritius & Seychellen*, p. 239 (*Pisania m.*).
1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 271, fig. 39 (radula).

Protoconch ? Postnatal whorls 7; axial ribs 10 on 1st whorl, increasing to 18 on penultimate whorl and becoming feeble and obsolete on later part of body whorl; crossed by spiral lirae 3 on 1st whorl, increasing to 8–9 on last whorl, with one very fine intermediary between some of the pairs, *c.* 12 additional lirae on base with intermediaries. Parietal callus dentiform,

columella anteriorly keeled, outer lip internally plicate. 23 (protoconch missing) × 10 mm.

White, variegated with indefinite yellowish and brown patches.

Radula with up to 114 rows, central plate with 3 major and 2 minor cusps, lateral plate with 2 cusps (Peile).

Natal (Krauss, and S. Afr. Mus.); Port Elizabeth and Natal (Sowerby).

Distribution. Mauritius, Seychelles, Philippine Islands.

Remarks. Peile shows that this species cannot be included in *Pisania* or *Cantharus* on account of its radula, which resembles that of *Engina*. He transfers it to *Engina* with a query.

Gen. Cantharus Bolten-Röding

1798. Bolten-Röding. *Mus. Bolten* (2), p. 132.
1834. Gray in Sowerby. *Gen. Sh.*, no. 42 (*Pollia*).
1840. Swainson. *Treat. Malac.*, lxxiv, p. 302 (*Tritonidea*).

Cantharus carinifera (Küster)

1858. Küster. *Conch. Cab.*, p. 63, pl. 12, figs. 9, 10.
1901. Smith. *J. Conch.*, x, p. 111, pl. 1, fig. 23 (*natalensis*).
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 229 (*natalensis*).

Aperture longer than spire. Protoconch 2 whorls, diam 1·3 mm., smooth. Postnatal whorls 5; axial ribs on first 2, sometimes 3 whorls 10, sometimes 11 on 3rd, then petering out though occasionally visible on 4th whorl; spiral lirae 4 on each whorl, strong on 4th and 5th whorls, with fine intermediaries on later whorls, on base 8 additional lirae, with intermediaries; parietal callus dentiform, columella keeled anteriorly, outer lip plicate within, the uppermost plica largest and dentiform. 22 × 12 mm.

Orange, with faint white peripheral band. Remains of brown fibrous periostracum in the spiral grooves.

Living: Umtwalumi and Port Edward (Natal) (U.C.T.).

Dead: off Tugela River (Zululand), 14 fathoms, 1 dead but fresh (Sowerby) the specimen referred to by Sowerby without locality) (S. Afr. Mus. P.F. coll.).

Remarks. From the description one suspects that Krauss's *rubiginosus* var. *subcostata* (1848, Südafr. Moll., p. 120; quoted in Sowerby. *Mar. Sh. S. Afr.*, p. 4, as 'scabricostata') was really *carinifera*.

C. undosus (Linn.), very similar with strong spiral lirae, has also been recorded (Sowerby 1889, 1892) as var. *minor* from Port Elizabeth. The locality is suspect.

Cantharus fumosus (Dillwyn)

1817. Dillwyn. *Catal. Sh.*, p. 629 (*Buccinum f.*).
1846. Reeve. *Conch. Icon.*, iii, no. 51 (*Buccinum proteus*).

1859. Chenu. *Man. Conchyl.*, i, fig. 622 (*Buccinum proteus*).
1880. Von Martens. *Mauritius & Seychellen*, p. 239 (*Pisania f.*).
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 303.
1957. Robertson. *Not. Nat. Philad.*, 300, figs. 5 (shell), 17 (radula).

A dead but fresh Delagoa Bay specimen was collected by U.W. Postnatal whorls 5; 10 broad and rounded axial ribs on each whorl, but not extending across base on body whorl; crossed by spiral lirae 4 on each of the early whorls, 5 on body whorl, rather sharp, with finer intermediaries, 7 additional main lirae on base, with intermediaries; growth-lines distinct. No parietal callus (but columella glaze not fully developed), columella keeled anteriorly, outer lip plicate within. 23 (protoconch missing) × 13 mm. Uniform grey.

Distribution. Mauritius, Seychelles, Madagascar, East Indies.

Remarks. This specimen corresponds well with Chenu's figure.

Cantharus insculpta (Sow.)

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 2, pl. 1, fig. 4 (*Tritonidea i.*).

Aperture a little longer than spire. Postnatal whorls 5 (Sowerby); axial ribs 12 on 3rd whorl, 14 on last whorl; crossed by spiral lirae 4 on 3rd whorl, 6–7 on last, 10–11 additional lirae on base; spaces between ribs and lirae rather deeply pitted on upper whorls, sculpture almost cancellate. Parietal callus dentiform, columella keeled anteriorly, outer lip smooth within. 11·5 × 6 mm. (Sowerby).

Yellowish-brown with white peripheral band (at or slightly above the actual periphery).

Dead: Port Alfred and Kowie (Sowerby, Bartsch, Turton, and S. Afr. Mus.).

Remarks. I have seen only beach-worn specimens lacking the protoconch.

Gen. Nassaria Link

1807. Link. *Beschr. Nat. Samml. Univ. Rostock* (3), p. 123.
1853. H. & A. Adams. *Gen. Rec. Moll.*, i, p. 123 (*Hindsia*).
1916. Iredale. *Proc. Mal. Soc.*, xii, p. 82 (*Hindsia* H. & A. Adams, 1850 [*sic*]).
1929. Thiele. *Handbuch*, i, p. 310.

Remarks. Iredale's argument for adopting *Hindsia* is not very conclusive; and *Nassaria* is not to be rejected on account of the earlier *Nassarius* (Rule Zool. Nomencl. Art. 36 Rec.).

Nassaria gracilis Sow.

Fig. 31(*b*), (*c*), (*d*)

1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 94, pl. 2, fig. 10.
1929. Dautzenberg. *Faune Col. Franc.*, iii, 4, p. 407.

Protoconch 1½ (2) whorls, diam. and alt. 0·75 mm., smooth and polished. Postnatal whorls 8½; first half whorl with 6–8 axial ribs, 9–10 on the following

whorl, increasing to (13) 14 on last whorl, fine growth-lines in the intervening grooves; crossed by spiral lirae 2 on first two whorls, a third lira appearing definitely on 3rd whorl but always less prominent than the other two, intermediaries developed from 4th whorl onwards, *c.* 10 additional lirae on base, with intermediaries; small complanate nodules at the intersections with the ribs. Parietal callus dentiform, columella angularly bent, canal narrow and curved, outer lip plicate within. Periostracum very thin. 29 (protoconch missing) × 15 mm.

Operculum broadly oval, rather thick and lamellate around margin, nucleus apical, 5 × 3·5 mm. in 31 mm. shell.

White with pale brown periostracum.

Radula with 75–85 rows, central plate with slightly concave front margin, 8 cusps (6 in another specimen), with 1–2 smaller ones in the middle, the number of small median cusps varies in different parts of the same radula; lateral plate bicuspid, outer cusp the larger. A Delagoa Bay specimen (fig. 31(*d*)) with 85 rows has a total of 9 cusps on the central plate, 5 shorter and narrower ones flanked on either side by 2 larger and broader ones.

Living: off Tugela River (Zululand), 40 fathoms (Sowerby); off Tugela River and Amatikulu River, 12–26 fathoms (S. Afr. Mus. P.F. coll.). Delagoa Bay (U.W.); 30° 47′ S. 30° 29′ E., 24 fathoms, and 33° 37′ S. 26° 56′ E., 46 metres (U.C.T.).

Distribution. Madagascar (Dautzenberg).

Remarks. The last rib in shells which appear to be fully adult is larger than the preceding ones and forms a varix on the outer lip; sometimes a varicoid rib is developed on one of the previous whorls, the following ribs being normal; smallest such shell seen: 20 mm. long.

N. acuminata Rve. has been recorded from Durban (1897. Sowerby. *Appen. Mar. Sh. S. Afr.*, p. 6), and differs (1902. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 95) in being larger, proportionately broader, fewer axial ribs, closer and less conspicuous spiral lirae.

The Delagoa Bay specimens, largest 29 × 16·5 mm., are relatively broader, but have the same number of axial ribs. The width of course varies according to whether the shell has reached a stage at which a varicoid outer lip is developed.

Dautzenberg said the Madagascan example agreed perfectly with a cotype from mouth of Tugela River, 40 fathoms, in his collection, which came from the MacAndrew collection. One wonders how a *Pieter Faure* shell found its way into the MacAndrew collection!

N. gracilis should be compared also with the Indian *nivea* (Gmelin) 1790 and *suturalis* Adams.

Genus Afrocominella Iredale

1917. Cooke. *Proc. Mal. Soc.*, xii, p. 227 (radula) (*Cominella* s.l.).
1918. Iredale. ibid., xiii, p. 34, line 22.

1926. Tomlin. *Ann. Natal Mus.*, v, p. 290.
1929. Thiele. *Handbuch*, i, p. 315 (as a section of *Burnupena*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 98 (radula).
1944. Stephenson. *Ann. Natal Mus.*, x, p. 344 (*Cominella*, list of species).
1947. id. ibid., xi, pp. 271–4 ('Cominella', distribution and notes on species).
1956. Orr. *Proc. Ac. Nat. Sci. Philad.*, cviii, pp. 249 and 251 (differences from *Burnupena*, species not discussed).

Oval-fusiform, spire usually high. Subsutural groove more or less distinct. Canal moderate. Fasciole absent. Early whorls with clathrate sculpture formed by spiral lirae and a *few* (11–12 on first whorl) axial ribs.

Penis without apical prong. Radula central plate as long as broad, with 3 cusps, lateral plate with strong outer cusp, and bifid inner cusp.

Genotype: *elongata* (Dnkr.).

Remarks. Thiele united both Iredale's genera, but he should not have subordinated *Afrocominella*, which has line precedence, to *Burnupena*.

The retention of two genera depends largely on the value attached to the differences in the radulae. In adults the two radula are clearly distinct, but in juvenile *Burnupena* the central plate may be not so broad as in the adult, approximating to the squarish shape found in *Afrocominella* (Peile, 1938, p. 98, fig. 33; Orr, 1956, p. 261). The lateral plates, however, always serve to differentiate the two genera. The sculpture of the early whorls seems to provide an additional distinction.

The two genera are here accepted. Miss Orr has come to the same conclusion.

Afrocominella contains three species (but not *puncturata* Sow. which is a Muricid), which may be distinguished as follows:

1. Axial ribs extending from suture to suture on early and later whorls, but often feeble on the latter.
   a. 7–9 costae on base of last whorl. Only spiral lirae in the subsutural groove (at most one weak costa) . . . . . *elongata*
   b. 12–15 costae on base. In the subsutural groove 1–3 well-marked costae *capensis*
2. Axial ribs on later whorls confined to the periphery, forming shoulder knobs *turtoni*

The differences between *elongata* and *capensis* are very slight and both are so variable that it is doubtful whether two species can be maintained; *capensis* has priority.

Afrocominella elongata (Dnkr.)

Fig. 31(*f*)

1857. Dunker. *Proc. Zool. Soc. Lond.* (for 1856), p. 356 (*Cominella e.*).
1899. Smith. *J. Conch.*, ix, p. 248, pl. 5, fig. 3 (*Cominella prolongata*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 48, pl. 3, fig. 7 (*C. alfredensis*).
1917. Cooke. loc. cit., p. 229, fig. 11 (radula) (*Cominella e.*), and fig. 12 (err.: as *tigrina*), and p. 234, fig. 7 (radula, err.: as 'Euthria queketti).
1918. Iredale. ibid., xiii, p. 34.
1932. Tomlin. *Ann. S. Afr. Mus.*, xxx, p. 166, fig. 7 (*Glypteuthria solidissima*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 98, fig. 34 (radula).
1938. Eyre and others. *Ann. Natal Mus.*, ix, pp. 96, 109 (*Cominella e.*).

1939. Eyre. ibid., ix, p. 304 (*Cominella e.*).
1947. Stephenson. ibid., xi, pp. 271–3 (distribution) (*Cominella e.*).
1952. Day and others. *Tr. Roy. Soc. S. Afr.*, xxxiii, p. 410.
1956. Orr. loc. cit., text-fig. 1 *i* (radula).

Aperture subequal to spire in juveniles, a little less in larger specimens. Protoconch 2½ whorls, diam. and alt. 1 mm., smooth. Postnatal whorls 9, whorls with distinct shoulder, spire more or less turreted, especially in early whorls; 11–12 axial ribs on 1st whorl, increasing to 15–16 (18) on 6th and 7th whorls, thereafter usually becoming irregular and indistinct, sometimes becoming obsolete from 5th onwards; crossed by 4 spiral lirae on 1st and 2nd whorls, the lowest (most anterior) being the strongest, on 3rd and following whorls the 2 or 3 peripheral lirae are the strongest, being almost costae; from 3rd whorl (at which stage the subsutural groove develops) onwards spiral striae between the lirae-costae, and especially in the subsutural groove (about 15 between suture and shoulder in later whorls); intersections subnodulose; 7–9 additional costae on base, upper ones more or less subnodulose, with intervening striae. Growth-lines (on all whorls) produce a minutely decussate or beaded appearance. Parietal callus dentiform; outer lip indented posteriorly (but not strongly), internally plicate.

61 (protoconch and whorls 1–3 missing) × 24 mm.; 55 (apex missing) × 25 mm.

Operculum oval, scarcely unguiform, 15 × 7 mm. in 52 mm. shell with aperture 27 mm.

Whitish with irregular chestnut or reddish-brown patches, spots and flames; periostracum brown; operculum brown. One specimen (Gr. Fish River, living) without any markings, periostracum grey-brown. Animal speckled with black or dark grey.

Radula with 90–115 rows, central plate about as long (incl. cusps) as wide (base 1½ as wide as long), with 3 cusps, lateral with bifid inner cusp, inner margin of inner prong feebly and obscurely serrulate. Variations: 4 cusps on central, a triple inner cusp on lateral on one side for part of radula (see Peile).

Living: South coast from False Bay to Qolora north of East London (Stephenson 1947); in addition: off Great Fish River, 22 fathoms (S. Afr. Mus. P.F. coll.). 33° 37′ S. 26° 56′ E., 46 metres (U.C.T.).

Stephenson (1947) recorded it also from Oudekraal on west coast of Cape Peninsula, but I have seen these specimens and consider them to be *capensis*.

Off Cape Point (mouth of False Bay) 45 fathoms (Tomlin: *G. solidissima*).

Remarks. Sometimes there are three subequal peripheral costae on the later whorls.

C. prolongata seems to be merely the full-grown *elongata* as shown by the series in S. Afr. Museum.

Two specimens each of *elongata* and *alfredensis* from Port Alfred, collected and presented by Turton, show no *differential characters*.

The identity of *G. solidissima* with *A. elongata* becomes quite clear when the details of the sculpture are compared. It might also be compared with the thick-walled varieties of *capensis* (p. 156), but only one, perhaps two, of the spirals in the subsutural groove are strong enough to be called costae.

In this case specimens of *elongata* in various stages of abrasion were found useful because the *solidissima* shell is slightly corroded in places.

Trophon acutispira (Sow.) is very like juvenile *elongata* of about the same size, but has fewer costae on the base.

Afrocominella capensis (Dnkr.)

Fig. 31(*e*)

1844. Dunker in Phillipi. *Abb.*, 1, p. 110, pl. 1, fig. 7 (*Fusus capensis*).
1852. Petit. *J. Conchyl.*, iii, p. 164, pl. 7, fig. 7 (*Fusus simonianus*).
1860. Gould. *Proc. Boston Soc., Nat. Hist.*, vii, p. 327 (*Euthrya lacertina*).
1874. Von Martens. *J. B. Deutsch. Malak. Ges.*, i, p. 133, pl. 6, fig. 2 (*Euthria lacertina*) (quotes Gould's description verbatim).
? 1877. Velain. *Arch. Zool. Exp. Gen.*, vi, p. 104, pl. 2, figs. 8–11 (*Euthria magellani*).
1903. Smith. *Proc. Mal. Soc.*, V, p. 371 (*Euthria c.* and *lacertina*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 25 (*Euthria c.*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 180, pl. 32 (20), fig. 3 (*Pisania costata*).
1938. Bright. *Tr. Roy. Soc. S. Afr.*, xxvi, p. 58 (*Pollia lacertina*).
1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 271 (radula) (*E. lacertina*).
1947. Stephenson. *Ann. Natal Mus.*, xi, pp. 271–3 (*Cominella lacertina*).

Aperture a little larger than spire. Protoconch 2½ whorls, diam. and alt. 1 mm., smooth. Postnatal whorls 6–7; whorls gently convex, profile of spire nearly straight, subsutural groove feeble; 11 (12) ribs on 1st whorl, increasing to 13–14 on 5th, thereafter becoming irregular and indistinct; crossed by 4 spiral lirae on 1st and 2nd whorls, 5 on 3rd, lirae becoming costae on later whorls and increasing in number to 10–12 on last whorl, with 12–15 additional ones on base; on last whorl costae all approximately of equal strength, but often a lira between each pair of costae; 1–3 *costae* in subsutural groove; the spiral sculpture is usually very regular and clear-cut, with rather deep sulci between the costae, the sulci striate with closely packed growth-lines. Parietal callus feeble; outer lip feebly indented posteriorly, internally plicate. 32 (protoconch missing) × 15 mm.

Operculum almost regularly oval, apex scarcely, if at all incurved, 8 × 4 mm. in 28 mm. shell.

White or greyish with fulvous or chestnut brown spots and axial streaks and flames, aperture more or less suffused; periostracum greyish-brown; operculum amber brown. Animal dark grey.

Radula with *c.* 90 (juv.) to 110 rows, central plate about as long (including cusps) as broad, base 1½ as wide as long, tricuspid, sometimes with a minute extra denticle on one side, lateral with bifid inner cusp, inner margin of inner prong obscurely serrulate.

Living: Port Nolloth to Cape Agulhas (Stephenson); east and west coasts of Cape Peninsula (S. Afr. Mus.).

Cape Agulhas (Petit: *simonianus*).*

The records (dead shells) from Port Elizabeth (Sowerby), Port Alfred (Turton), and Natal (Sowerby) need confirmation.

Remarks. A slender specimen, 44 × 18 mm. (S. Afr. Mus. no. 4709) locality unknown, but probably Cape, was identified by J. H. Ponsonby as *magellani*, which Smith (1903) thought might be also synonymous with *capensis*.

Three dead specimens from Green Point (Cape Town) (S. Afr. Mus. no. 5518), 20 × 11, 24 × 11 and 25 × 14 mm., white with traces of brown flames: the smallest is slightly thicker-walled and weighs the same as the 24 mm. specimen; the largest is plumper and thicker-walled.

Four other dead specimens (S. Afr. Mus. no. 4753), locality unknown, but probably also Cape Town, 17 × 9, 24 × 12, 26 × 14, and 29 × 15 mm. are rather plump. The 2 larger ones are thick-walled, the largest especially so, with a thickened and strongly plicate outer lip. These were identified as *magellani* by J. H. Ponsonby.

There are two dead shells, 19 × 10 and 27 × 15 mm., from Table Bay (S. Afr. Mus. 5465); the larger is thick-walled, and both have the outer lip plicate.

Very different, at first glance, from these thick-walled specimens, are 4 specimens from the P.F. collection but without exact locality (S. Afr. Mus. A4732). One was taken alive, and the operculum, but not the animal, was preserved. They are all thin-walled and slender: 25 × 10 and 26 × 11 mm. Nevertheless they conform in all characters with the above description.

The 'straight' sides, regularity of the spiral sculpture, and the large number of costae on the base distinguish this species from *elongata*.

Smith's suggestion that *magellani* from St. Paul Island might be synonymous seems rather unlikely, but should be investigated. Sowerby's record (1897) of *magellani* from Natal is certainly erroneous.

In spite of Thiele's statement that the *Valdivia* specimen is different in shape from *Euthria capensis*, it might perhaps be assigned to this species or to *elongata*. Thiele described it (or another specimen) as *Pisania costata*. There is a specimen from Sea Point (Cape Town) (S. Afr. Mus. no. 4974) of almost the same size (Thiele 18 × 7·5 mm., S. Afr. Mus. 18 × 8 mm.); if Thiele's figure correctly indicates the size of the costae in the subsutural groove, and the number of costae on the base, *Pisania costata* can well be regarded as a *capensis*. The axial ribs, however, appear from the figure (the number is not given in the description) to be fewer. Von Martens's and Thiele's locality: 34° 51′ S. 19° 37′ E., 80 metres.

There is little difference in Petit's figure of his *simonianus* and von Martens's figure of *lacertina*. I think there is little doubt that *simonianus* should fall into the synonymy of *capensis*.

* Named after M. de Saint-Simon, not after Simon's Bay.

The difficulty of assigning some specimens to a particular species is shown by the following description of a specimen labelled by Sowerby (3rd) as '*simoniana* juv.' with a query.

Fusiform, profile of whorls very slightly convex. Protoconch 2½ whorls, diam. and alt. 1 mm., smooth. Postnatal whorls 5; low axial ribs 13 on 1st whorl, increasing to 18 on last, on 1st–3rd whorls distinct from suture to suture, but becoming indistinct on 4th and first part of 5th and indicated only by a double row of feeble peripheral knobs, and obsolete on body whorl; crossed by very fine spiral striae, visible chiefly between suture and periphery on last two whorls and on base, on the latter there are 4 or 5 slightly stronger lirae, and half a dozen closer together on rostrum. No parietal callus, columella curved, canal rather narrow and reflexed, outer lip simple. 21 × 9 mm. Pale buff.

Off East London, 40 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. This specimen is closely similar to a 22 × 10 mm. specimen of *Afrocominella elongata* from Qolora, and also with some of the specimens (A4732) referred to *A. capensis*, though much smoother.

Afrocominella turtoni (Bartsch)

1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 50, pl. 3, fig. 6 (*Euthria t.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 54 (*Euthria t.*).

Spire turreted. Profile with shoulder at middle of whorl. Protoconch 2½ whorls, diam. 1·2, alt. 1 mm., smooth. Postnatal whorls 5; axial ribs 10 on 1st and 10–11 on 2nd whorl, increasing to 12 on 5th whorl, from suture to suture on 1st and 2nd, but from 3rd whorl onwards evanescent between suture and periphery, where they form prominent shoulder knobs; not extending across base; crossed by 4–5 fine spiral lirae on 1st whorl, on 2nd whorl 4 above and 3 below the (incipient) shoulder, increasing to 12–15 above and 10–12 below on 5th whorl; base with *c.* 30 additional closely packed lirae, of which 7 or 8 are slightly stronger than the others. Parietal callus not developed, canal straight, outer lip not plicate within. 22 × 9·5 mm.

Operculum oval, nucleus apical, scarcely incurved, 5 × 2·5 mm. in 22 mm. shell with 11 mm. aperture.

Castaneous above the shoulder, and between the knobs, ochraceous below, operculum amber. Animal pale with dark grey speckling around foot.

Radula with *c.* 120 rows, central plate about as long (incl. cusps) as wide, base rectangular, with 3 cusps, lateral plate with bifid inner cusp.

St. Francis Bay (34° 15′ S. 25° 5′ E.), 6 fathoms (U.C.T.).

Remarks. The above description is taken from the, as yet, only specimen known to have been collected alive. Its radula showed it to be an *Afrocominella*. This was not unexpected because Turton said (loc. cit., p. 52) that some of his specimens were identified by Smith as *capensis*, and S. Afr. Mus. specimens with the *turtoni* coloration were identified many years ago by J. H. Ponsonby as *elongata*.

Beach-worn examples from Port Alfred and Still Bay (S. Afr. Mus.) up to 40 mm. in length, with 6–7 whorls, yellowish or orange-brown and showing more or less the castaneous patches between the knobs, agree in sculpture with the above description. A second row of less prominent nodules below the shoulder knobs is sometimes present. The parietal callus is nodiform.

Three P.F. specimens, dirty white without any colouring, also agree, but are thicker walled, especially the largest. The outer lip tends to be slightly exsert and thickened within, with about 10 denticles in the largest specimen (merely indicated in the other two).

33 (apex and rostrum broken) × 17 mm. (7 whorls); 26 (apex and tip of rostrum broken) × 12 mm. (6 whorls); 17·5 × 8 mm. (5 whorls).

Off Great Fish Point, 57 fathoms (largest); off East London, 32 fathoms; off Hangberg (Knysna, *not* Hangklip, False Bay), 48 fathoms (smallest); one dead but fresh example from each locality (S. Afr. Mus. P.F. coll.).

Gen. Burnupena Iredale

1917. Cooke. *Proc. Mal. Soc.*, xii, p. 227 (radulae) (*Cominella* s.l.).
1918. Iredale. ibid., xii, p. 34, line 24.
1926. Tomlin. *Ann. Natal Mus.*, v, p. 291.
1929. Thiele. *Handbuch*, i, p. 315 (incl. *Afrocominella*).
1938. Bokenham & Neugebauer. *Ann. Natal Mus.*, ix, p. 133 (egg-capsule).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97, and 1939, p. 270 (radulae).
1944. Stephenson. *Ann. Natal Mus.*, x, p. 344 (list of species, *Cominella*).
1947. id. ibid., xi, pp. 271–4 (distribution and notes on species, *Cominella*).
1951. Barnard. *Beginner's Guide S. Afr. Shells*, fig. 35 (egg-capsule).
1956. Orr. *Proc. Ac. Nat. Sci. Philad.*, cviii, p. 250 et sqq. (revision and ecology of species).*

Ovate, sometimes slightly fusiform, spire low or not very high. Subsutural canal usually distinct. Canal short. Fasciole distinct. Early whorls either cancellate-nodulose (axial ribs on 1st whorl *numerous*: 18–20), or with spiral sculpture only.

Penis with apical prong. Radula central plate wider than long, with (3–4 juv.) 5–7 (8) cusps, lateral plate with strong (usually not so strong as in *Afrocominella*) outer cusp and trifid inner cusp. Malformations and asymmetry frequent.

Genotype: *cincta* (Bolten-Röding).

Remarks. The egg-capsule and protoconch described below undoubtedly belong to a *Burnupena*, but whether the species is *cincta* or *papyracea* is uncertain. I have found them at St. James (False Bay), and Bokenham and Neugebauer collected them at Sea Point (Cape Town) and St. James. Actual spawning has not been observed.

After examining the S. Afr. Mus. collection (mostly dead specimens), and the large U.C.T. collection of material taken alive by Prof. Stephenson and Prof. Day, I have come to the conclusion that six species: *cincta*, *lagenaria*,

* Some typ. err. and laps. cal. In the Bibliography, Bokenham & Neugebauer 1938, for '*Tr. Roy. Soc. S. Afr.*' read: *Ann. Natal Mus.*; for 'Piele' read: Peile.

papyracea, *limbosa*, *delalandii* and *tigrina*, can be more or less satisfactorily separated.

Stephenson's remarks (1947, p. 272), however, are fully justified. Some examples are impossible to assign definitely to one species or another, owing to the frequent occurrence of intergrading forms which Stephenson suggested might possibly be hybrids. The two most confusing pairs are *cincta-lagenaria* and *limbosa-delalandii*. But in spite of intergrading forms, the extremes are distinctive, and for this reason might well be retained as separate species.

A. Early whorls with spiral sculpture only.
  1. Whorls with spiral lirae and more or less numerous well-marked costae. Pale spots around spire (if not corroded).
    a. Angle of spire 50°–65° . . . . . *cincta* (intermediates)
    b. Angle of spire 70°–85° . . . . . *lagenaria*
  2. Numerous striae and lirae, but none enlarged to costae.
    a. Subsutural groove not, or only feebly, developed. Profile of whorls evenly convex. Aperture white . . . . . *papyracea* (intermediates)
    b. Subsutural groove well developed.
      i. Brown, aperture more or less suffused . . . . . *limbosa* (intermediates)
      ii. Purplish-brown, aperture deeply suffused purplish-brown or violaceous . . . . . *delalandii*
B. Early whorls cancellate-nodulose, the axial ribs numerous (18–20) . . . *tigrina*

To Stephenson's summaries of the distribution of each species are added the localities of the S. Afr. Mus. examples (when definitely known). Little reliance, however, can be placed on some of the earlier records.

Only selected references to each species are given, mainly those of recent years. In some cases likely synonyms are suggested.

Since the completion of my study of this genus, Miss Orr's valuable paper has appeared. It is refreshing to have a revision of a genus based on living material personally collected and studied in the field. After investigating habitats and ecology at several localities around the South African coast, Miss Orr has reduced the number of species to two; *papyracea* and *delalandii*, the former with *papyracea* s.s., *cincta*, *lagenaria* and *tigrina* as subspecies.

To some extent shell characters were found correlated with habitat, e.g. the strongly costate *cincta* inhabits intertidal pools along the south coast, finely striate form :being found in the colder subtidal zone, and especially on the west coast; shells in sheltered situations usually have higher spires than those from exposed habitats.

Basically there is little difference between Miss Orr's conclusions and my own; the main difference concerns the taxonomic status of the forms. Feeling that the last word, ecologically and taxonomically, has not been said, I am retaining my diagnoses.

The spawning habits need investigation. And if in the future it should be found possible to breed these molluscs under artificially controlled conditions,

instructive results may be obtained. It would be interesting, for example, to see what sculpture would be found on the progeny of a *cincta* × *tigrina* hybrid (cf. fig. 32(*e*) and (*f*)).

Burnupena cincta (Bolten)

Figs. 31(*g*), 32 (*a-d*), (*e*)

1790. Gmelin. *Syst. Nat.*, ed. 13, p. 3494, no. 105 (*Buccinum porcatum*, non da Costa 1778).
1798. Bolten-Röding. *Mus. Bolten.*, p. 113.
1874. Von Martens. J.B. *D. Malak. Ges.*, p. 136 (*Buccinum p.*).
1886. Watson. *Challenger Rep.*, xv, p. 214 (*Cominella p.*) (references).
1889. Studer. *Forschungsreise d. 'Gazelle'*, III, pp. 52, 55 (*Buccinum p.*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 52 (*Cominella p.*).
1917. Cooke. loc. cit., p. 229, fig. 1 *b* (radula) (*Cominella p.*).
1918. Iredale. ibid., xiii, p. 34.
1926. Tomlin. *Ann. Natal. Mus.*, v. p. 291.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 52, pl. 12, no. 381 (*cincta* var. *adjacens*).
1937. Stephenson and others. *Tr. Roy. Soc. S. Afr.*, xxvi, p. 357.
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97 and p. 98 (*dunkeri* (radula).
1938. Stephenson. *Ann. Natal Mus.*, ix, p. 10.
1938. Eyre and others. ibid., ix, p. 96.
1938. Bokenham & Neugebauer. ibid., ix, p. 133, pl. 16, figs. 1–3, 5, 6, 9 (egg-capsule, development, protoconch).
1939. Eyre. ibid., ix, p. 298.
1940. Broekhuysen. *Tr. Roy. Soc. S. Afr.*, xxviii, pp. 255 *et passim* (fig. 1 chart of vertical distribution).
1947. Stephenson. *Ann. Natal Mus.*, xi, pp. 272, 273.
1952. Day and others. *Tr. Roy. Soc. S. Afr.*, xxxiii, p. 410.
1956. Orr. loc. cit., p. 254, pl. 19, figs. 5, 6, text-fig. 1 *b*, *c*, pl. 20, fig. 2.

No axial sculpture on any of the whorls. Aperture a little longer than spire. Ratio breadth to length = 1 : 1·6–2. Angle of spire 50°–65°. Protoconch ovoid, 2½ whorls, diam. 1·3–1·5 mm., alt. 2–2·5 mm.* (specimens taken from egg capsules), smooth but with *c.* 15 spiral lirae beginning on last half whorl. Postnatal whorls 7, with subsutural groove; 3 broad flattish spiral costae, the uppermost adjoining suture, the 2nd forming lower border of subsutural groove, the 3rd usually partly or wholly covered on the upper whorls by the succeeding whorl; 3 (nos. 4, 5, 6 in fig. 32(*a*)–(*d*)) additional costae on base of body whorl; usually an additional narrower costa between each pair of major costae, but not between 1st and 2nd (except in one specimen); costae and grooves (incl. subsutural groove) with fine spiral striae. Parietal callus dentiform; canal reflexed; outer lip undulate on margin (corresponding with the costae), but usually not plicate internally (in fresh intact specimens the actual edge may be finely crenulate, corresponding with the striae). Periostracum thick, fibrous-fimbriate. 59 (apex corroded) × 31 mm. Plump and slender forms, e.g. 50 × 30 mm. and 51 × 27 mm. (same locality).

Operculum ovate, somewhat unguiform, apex incurved, 23 × 11 mm. in 55 mm. shell.

* i.e. including the sculptured portion—smooth portion 0·9–1 mm.

Orange-brown with darker marks and spots alternating with white marks on the major costae; coloration obscured in living examples by dark brown periostracum, except on the upper whorls where the alternate brown and white 'necklace' remains on 1st and 2nd costae; in large specimens the early whorls are nearly always corroded; aperture and columella white, but outer lip sometimes slightly suffused internally; operculum dark brown. First whorl of protoconch white, second fawn. Periostracum often stained with green algae. Animal mottled or streaked with blackish-grey.

Radula with 110–120 rows, central plate wider than long, with 6 denticles (sometimes only 5), lateral with trifid inner cusp, the 2 inner prongs feebly serrulate on their opposing edges. Peile: denticles on central 5–9, usually 6–7, his fig. 33 of *dunkeri* is a juvenile radula with central plate not so wide as in adult and with only 3 cusps.

Egg-capsule a triquetral prism, length 7–9 mm., maj. diam. 3–3·5 mm.; outer (convex) surface with a median keel in the basal quarter or third; apex sometimes fimbriate. Numerous capsules are attached by their base in oval or circular clumps, $\frac{1}{2}''$ to $2''$ in diameter, to rock-surfaces or fronds of seaweeds.

Living: False Bay to The Haven (north of East London), and sporadically on west coast as far north as Steenberg Cove (St. Helena Bay) (Stephenson 1947); also Richmond (Alexandria Division) (U.C.T. Ecol. Surv.); the west coast localities are Sea Point (Cape Town), Langebaan, Steenberg Cove, and Lüderitzbucht (U.C.T.). Simon's Bay (False Bay) 10–20 fathoms (Watson). Kalk Bay and Zwartklip in False Bay (S. Afr. Mus. coll. K.H.B.).

Dead: several localities within the above range (previous authors, and S. Afr. Mus.). 34° 6′ S. 18° 6′ E., 117 fathoms (Studer), Saldanha Bay, and other localities to Natal (von Martens), Cape Congo, Angola (Orr).

Remarks. As a rule the spiral costae are well developed and broad; where intermediaries are developed the major costae tend to be narrower. On the body whorl there is a possible maximum of 10: 6 major and 4 intermediaries (fig. 32(*a*)); a total of 7, 8 or 9 is common, but 10 is rare. Sometimes nos. 2, 3 and intermediary 2*a* are subequally narrow (fig. 32(*b*)); in another variation all the costae may be narrow and consequently widely spaced (fig. 32(*c*)).

In only one specimen have I seen an intermediary in the subsutural groove between the 1st and 2nd major costae, thus tending to obliterate the groove (fig. 32(*d*)).

The costae are sometimes very flat.

There are high-spired (*cincta* s.s.) and low-spired forms, the latter being broader, more squat, and approaching the *lagenaria* shape (cf. Stephenson 1947). The U.C.T. collection has transitional examples from Langebaan (West Coast), St. James (False Bay), Danger Point, Cape Agulhas, Mossel Bay, Kleinmond and Richmond (Bathurst and Alexandria Div.), Qolora, Port St. Johns.

From Lüderitzbucht (U.C.T. L.U. 29.C.) I have seen two specimens of

somewhat squat form, brightly coloured with flames in the subsutural groove, and 'necklaces' of dark and light spots on each costa.

One specimen from Kalk Bay (False Bay) with aberrant operculum: oval with subcentral nucleus (cf. *lagenaria* aberr.).

Burnupena lagenaria (Lam.)
Fig. 31(*h*)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 245 (*Purpura l.*).
1832. Duclos. *Ann. Sci. Nat.*, xxvi, p. 112, pl. 2, fig. 12 (*P. cucurbita*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 52 (*Cominella l.*).
1910. Schwarz. *Tr. Geol. Soc. S. Afr.*, xii, p. 114.
1917. Cooke. *Proc. Mal. Soc.*, xii, p. 229, fig. 14 (radula).
1922. Tomlin. *J. Conch.*, xvi, p. 260.
1929. Thiele. *Handbuch*, i, fig. 349 (radula).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97 (radula).
1938. Stephenson and others. *Ann. Natal Mus.*, ix, p. 10.
1938. Eyre and others. ibid., p. 96.
1938. Eyre. ibid., p. 298.
1947. Stephenson, ibid., xi, pp. 272–4.
1956. Orr. loc. cit., p. 256, pl. 19, fig. 9, text-fig. 1 *g*, *h*.

No axial sculpture on any of the whorls. Proportionately broader than *cincta*: ratio breadth/length 1 : 1·3–1·6; angle of spire 70°–85°. Fine spiral lirae on all whorls. Spiral costae as in *cincta*, i.e. 6 major costae with a varying number of intermediaries (1–4), but much flatter and less well developed; nevertheless, the major costae, though faint, can be distinguished from the finer lirae. Parietal callus dentiform; outer lip more often plicate on margin but the plicae not extending internally. Upper whorls usually corroded. 40 × 26 mm.

Operculum ovate, apex somewhat incurved, 12 × 8 mm. in 30 mm. shell, 14 × 8 in 32 mm. shell.

Coloration similar to that of *cincta*: in worn shells the 'necklace' pattern is well marked, but not so obvious when covered by the periostracum; outer lip internally strongly suffused with orange-brown or chestnut, often with a livery tinge (Krauss: 'brownish-violet'), paler at the actual margin.

Radula with 120–130 rows, central plate wider than long, with 6(7) denticles (Thiele's figure shows 5 denticles with a minute 6th at one side; Cooke shows 6 plus 1; Peile gives 4–8, 5 being the normal number); lateral with trifid inner cusp.

Fossil: Pleistocene, Port Elizabeth (Schwarz).

Living: False Bay to Umhlali, Natal (Stephenson 1947); Zwartklip, False Bay (S. Afr. Mus. coll. K.H.B.).

Dead: various localities within the above range (previous authors); also Walfish Bay (von Martens); Lüderitzbucht (von Martens, Tomlin); Table Bay (von Martens).

Remarks. The broad squat form with deeply suffused aperture is easily distinguished from the high-spired *cincta* with pale aperture. But there are intermediates combining a high spire with a suffused aperture.

Moreover, juveniles are often particularly difficult to assign to one or the other species. See Stephenson 1947, and examples in U.C.T. Ecol. Surv. Coll.

Aberrations. One freak subscalariform specimen taken alive in False Bay (S. Afr. Mus. 11117), 27 mm. long, has the spire 13 mm., width 14 mm. aperture 14 mm. long, (ratio breadth/length almost 1 : 2); angle of spire approx. 40°. Almost the whole shell is badly corroded, but the uncorroded part (*c.* 10 mm.) of the last whorl retains the periostracum and shows 6 very flat major costae, with intermediaries anteriorly; aperture internally suffused. Identified by Tomlin as *lagenaria*; I agree.

In one specimen the operculum is oval with nucleus subcentral. (cf. *cincta* aberr.).

Burnupena papyracea (Brug.)

1789. Bruguière. *Encycl. Meth. Vers.*, I, p. 260 (*Buccinum p.*).
1816. Lamarck. *Tabl. Encycl.*, pl. 400, figs. 3 *a*, 3 *b*, and Liste, p. 2 (*Buccinum p.*).
1846. Reeve. *Conch. Icon.*, pl. 5, sp. 32 (*Buccinum intinctum*).
1848. Krauss. *Südafr. Moll.*, p. 120 (*Buccinum intinctum*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 52 (*Cominella p.*).
1922. Tomlin. *J. Conch.*, xvi, p. 260.
1938. Bright. *Trans. Roy. Soc. S. Afr.*, xxvi, pp. 62, 72.
1939. Peile. *Proc. Mal. Soc.*, xxiii, p. 270.
1940. Stephenson and others. *Ann. Natal Mus.*, ix, p. 356.
1947. Stephenson. ibid., xi, pp. 273, 274.
1956. Orr. loc. cit., p. 252, pl. 19, figs. 1–4, text-fig. 1 *d*, *e*.

Profile of whorls convex, without subsutural groove except sometimes a trace on last whorl in adult. Protoconch $2\frac{1}{2}$ whorls, diam, and alt. 1·5 mm., smooth. Postnatal whorls 5; spiral lirae 5 on 1st whorl, increasing to 14–15 on last whorl, with *c.* 20 additional on base; on early whorls the lirae regular in size and spacing, but on base the alternating intermediaries are weaker. Parietal callus dentiform; outer lip very feebly indented posteriorly in adult, internally plicate. 45 (apex broken) × 26 mm.; 57 (apex and lower part of outer lip worn) × 32 mm.

Operculum ovate, apex somewhat incurved, 15 × 7 mm. in 40 mm. shell.

Uniform yellow, orange-brown or castaneous, aperture internally white (except in thin-walled juveniles), periostracum and operculum brown.

Radula with 115 (one specimen examined; Peile 95–100) rows, central plate with 6 denticles, lateral with trifid inner cusp, the 2 inner points with their opposing margins feebly serrulate.

Living: west coast from Port Nolloth to Cape Peninsula, and eastwards as far as Hermanus (Stephenson 1947); Lüderitzbucht (U.C.T.).

Dead: Still Bay and Port St. Johns (S. Afr. Mus.); Lüderitzbucht (von Martens, Tomlin); Olifants River, Table Bay, False Bay, Pondoland (von Martens); other records by previous authors, extending to Natal, require confirmation.

Distribution. Gabun, French Equatorial Africa (Orr).

Remarks. Description based on specimens (S. Afr. Mus.) identified by Tomlin, who used the name *papyracea*. Krauss preferred to regard the South African specimens as a species different from the Norwegian (*fide* Kiener) *papyracea* under the name *intincta* Rve.

The uppermost 4 lirae on the penultimate and ultimate whorls occupy the space of the undeveloped subsutural groove; the 4th may be a trifle stronger and form a very obscure shoulder (but without a concave groove above). The convex, in plump examples almost globose, profile of the whorls is the most noticeable feature. The white aperture also seems characteristic.

The plicae within the aperture are already developed in juveniles 6–7 mm. long.

Two specimens in the *Pieter Faure* collection (S. Afr. Mus. no. A8607. P.F. 12558) come from: Cape Natal W × N ¾ N. 185–200 fathoms. The depth seems excessive for species of this genus, and probably the specimens have been mislabelled.

Frequently covered with a dark purplish-brown Polyzoan (*Alcyonidium nodosum*), which is not known to occur on any other shell (Stephenson, 1947, p. 273). I have examined the U.C.T. Ecol. Survey collection and can confirm Stephenson's statement. Whenever *limbosa* and *papyracea* occurred at the same locality, specimens with the Polyzoan coat proved to be *papyracea* as here diagnosed.

Specimens of *tigrina*, however, were also found to be covered with a very similar growth, which has not yet been identified.

Burnupena limbosa (Lam.)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 243 (*Purpura l.*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 52 (*Cominella l.*).
1908.* Melvill & Standen. *Tr. Roy. Soc. Edinb.*, xlvi, 1, p. 154.
1909. id. *Sci. Res.* '*Scotia*', v, p. 124 (reprint of previous paper).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 47, pl. 4, fig. 6 (*C. porcata* var. *multilirata*).
1917. Cooke. *Proc. Mal. Soc.*, xii, p. 229, fig. 15 (radula) (*Cominella l.*).
1923. Odhner. *Göteb. K. Vet. Handl.*, xxvi, p. 6 (*Cominella l.*).
1926. Tomlin. *Ann. Natal Mus.*, v, p. 291.
1938. Bright. *Tr. Roy. Soc. S. Afr.*, xxvi, pp. 58, 62.
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97 (radula).
1939. id. ibid., xxiii, p. 270, fig. 38 (radula).
1940. Stephenson and others. *Ann. Natal Mus.*, ix, p. 356.
1947. Stephenson. ibid., xi, pp. 273, 274.
1956. Orr. loc. cit., p. 252 (as syn. of *papyracea*).

Ratio breadth/length 1 : 1·6–1·8. Angle of spire 70°–90°. Aperture twice spire. Protoconch ? Postnatal whorls ? 5. Subsutural groove present, but no sutural costa. Whole whorl with numerous spiral lirae of almost equal strength, but those on base somewhat stronger. Parietal callus dentiform; canal reflexed; outer lip with numerous plicae extending inwards from the margin. Perio-

* Issued separately 1907.

stracum thick, fibrous-fimbriate. 60 × 38 mm. Also: 58 × 31 mm. (apex and lower part of outer lip worn), 56 × 33 mm.

Operculum ovate, apex somewhat incurved, 17 × 9 mm. in shell 41 × 26 mm.

Uniform yellowish-brown, aperture more or less suffused with fawn at margin internally, periostracum brown, operculum dark brown.

Radula with *c.* 130 rows, central plate with 6 denticles (Peile gives 6–8, usually 7), lateral with trifid inner cusp. Peile (1939) figures a variation.

Living: west coast from Port Nolloth to the Cape Peninsula, further east? (Stephenson 1947).

Dead: Table Bay (Sowerby, and S. Afr. Mus.); Walfish Bay, Lüderitzbucht, Saldanha Bay, Table Bay (von Martens); other records by previous authors require confirmation.

Remarks. Distinguished from *lagenaria* by the uniform strength of the lirae, without any suggestion of major costae; and also by coloration.

Why *multilirata* was made a subspecies of *porcata* (= *cincta*) was not explained by Bartsch; it appears to be a normal specimen of *limbosa.*

Orr regards *limbosa* as a synonym, not even a subspecies, of *papyracea papyracea* (p. 253).

Burnupena delalandii (Kiener)

1833. Quoy & Gaimard. *Voy. Astrolabe Moll.*, p. 456, pl. 30, figs. 32–34 (*Buccinum violaceum*).
1834. Kiener. *Coq. Viv.*, p. 33, pl. 8, fig. 23 (*B. violaceum*).
1834. id. ibid., ix, p. 15, pl. 5, fig. 14 (*Buccinum delalandii*).
1848. Krauss. *Südafrik. Moll.*, p. 120 (*Buccinum v.* and *d.*).
1917. Cooke. *Proc. Mal. Soc.*, xii, p. 229, fig. 13 (radula) (*Cominella d.*).
1918. Iredale. ibid., xiii, p. 34 (*Burnupena delalandii*).
1923. Odhner. *Göteb. K. Vet. Sam. Handl.*, xxvi, p. 6 (*Cominella d.*).
1926. Tomlin. *Ann. Natal Mus.*, v, p. 291 (*Afrocominella d.*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97, fig. 31 (radula).
1938. Bright. *Tr. Roy. Soc. S. Afr.*, xxvi, pp. 76, 84, 86, 87 (*Cominella d.*).
1940. Stephenson and others. *Ann. Natal. Mus.*, ix, p. 356 (*Cominella d.*).
1947. Stephenson. ibid., xi, pp. 272, 273 (*Cominella d.*).
1956. Orr. loc. cit., p. 258, pl. 19, fig. 10, text-fig. 1 *f*, pl. 20, fig. 1 (*delalandii*).

Aperture a little larger than spire. Protoconch 2½ whorls. Postnatal whorls 5; subsutural groove present; spiral striae on all whorls, about 8 on 3rd whorl increasing to 15–20 on later whorls, with *c.* 16 additional ones on base, the latter becoming slightly deeper and farther apart anteriorly (more like shallow sulci). Parietal callus dentiform; outer lip indented posteriorly, posterior canal well marked; internally plicate. Periostracum fibrous-fimbriate. 55 (apex corroded) × 30 mm.

Operculum ovate, somewhat curved inwards apically; 20 × 10 mm. in 55 mm. shell.

General coloration dark purplish-brown, especially juveniles, larger examples show purplish lirae on a paler ground colour on the base and where the periostracum is worn; sometimes with dark axial flames on the paler

ground, but these more often visible in dead and worn specimens than living; periostracum brown; aperture violaceous or purplish-brown, operculum dark brown.

Also, flames appear to be more frequently developed in some localities e.g. Langebaan Lagoon and Hondeklip Bay.

Radula with *c.* 110–120 rows; central plate wider than long, 6–7 denticles (Peile gives 4–7, usually 6), lateral with trifid inner cusp, the inner and middle points of which are feebly serrulate on their opposing margins.

Living: Stephenson (1947) records this species as common on the west coast from Port Nolloth southwards, and extending on the south coast as far as Hermanus.

In view of Stephenson's results, based on living material, the records of Bartsch and Turton (6 specimens and 1 resp.) which are the only records east of Cape Agulhas, can be disregarded.

Dead: (*violacea*) Table Bay (Quoy & Gainard); (*delalandii*) Cape (Kiener); Dyer Island (Agulhas) (Odhner). Kalk Bay (False Bay), Dassen Island (Table Bay), (S. Afr. Mus.).

Remarks. The dark purplish colour with violaceous aperture of living examples is distinctive, and suggests that this was the species collected in Table Bay and described by Quoy & Gaimard as *violacea*. However, as I have not seen the original figures, or the specimen (if it is still extant!), and as there are other possible shells (e.g. *Thais capensis*, *T. dubia*, perhaps even a worn and stained *Fasciolaria lugubris*), Kiener's name is retained. Orr regards *violacea* as a synonym of *papyracea cincta*.

The apices of all specimens I have seen are more or less corroded; consequently the details of the protoconch and first two whorls cannot be given. Smallest specimen seen 8·5 mm. long.

There are slender and plump examples, irrespective of sex, e.g.:

♂♂ 29 × 19, 34 × 21 mm.
♀♀ 30 × 18, 33 × 21, 34 × 22, up to 53 × 32, 55 × 30 mm.

There are no clear-cut conchological differences between this species and *limbosa*. Fresh specimens may be separated by coloration, but worn and faded individuals are impossible to assign to one or the other 'species'.

Burnupena tigrina (Kien.)

Fig. 32(*f*)

1834. Kiener. *Coq. Viv.*, ix, p. 27, pl. 10, fig. 32 (*Buccinum t.*).
1848. Krauss. *Südafr. Moll.*, p. 120 (*Buccinum t.*) (says name is preocc. by Gmelin and must be changed).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 10, pl. 1, fig. 7 (*Cominella semisulcata*).
1917. Cooke. *Proc. Mal. Soc.*, xii, p. 229, fig. 12 (radula) (*Cominella t.*).
1918. Iredale. ibid., xiii, p. 34.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 51, pl. 12, no. 379 (*Cominella translucida*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 97, fig. 32 (radula).

1947. Stephenson. *Ann. Natal Mus.*, xi, pp. 273, 274.
1956. Orr. loc. cit., p. 255, pl. 19, figs. 7, 8, text-fig. 1 *a*.
Not 1917. Cooke. *Proc. Mal. Soc.*, xii, p. 229, fig. 12 (radula) (= *A. elongata*).

Aperture longer than spire. Protoconch 2½ whorls, diam. 1·3 mm., smooth but with nodulose-cancellate sculpture in last half whorl. Postnatal whorls 6; early whorls cancellate-nodulose; 18 (19) riblets on 1st whorl, increasing to *c.* 28–30 on last whorl, extending from suture to suture except on 5th and 6th whorls where they form only nodules on the subsutural costa and the costa forming lower border of subsutural groove, and less distinctly on some of the costae below; spiral costae 4 (sometimes 5), of equal strength on 1st and 2nd whorls, but on 3rd and later whorls the subsutural costa and the one forming the shoulder become stronger than the others; also from 3rd whorl onwards an intermediary develops in the subsutural groove, increasing to 3 or 4 on last whorl; 9–10 additional costae on base; all the costae and intervening grooves may have fine lirae. Parietal callus dentiform; outer lip indented posteriorly, internally smooth (lirae showing through half-grown shells simulate plicae, but this is due to colour only, not sculpture). Periostracum fibrous. 40 × 22 mm., 41 × 20 mm.

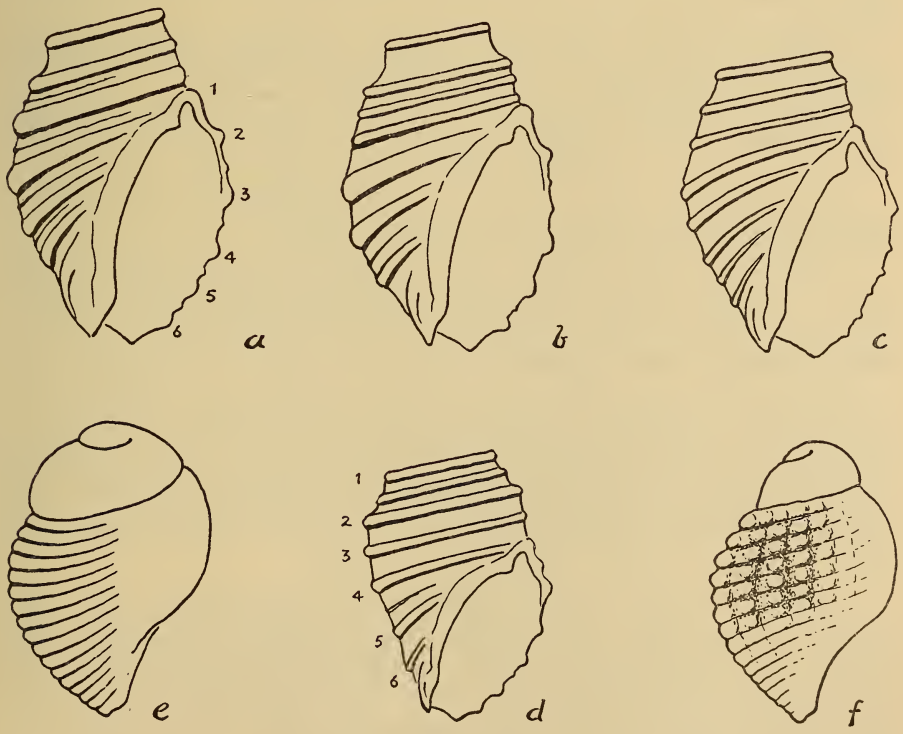

Fig. 32.
(*a*)–(*d*) *Burnupena cincta* (Bolten) body whorl to show variation of costae (semi-diagrammatic). (*e*) protoconch. (*f*) *B. tigrina* (Kien.) protoconch.

Operculum ovate, somewhat incurved apically, 8·5 × 4 in 25 mm. shell.

'Leonine' coloration: uniform tawny or yellowish-brown, periostracum a little darker.

'Tigrine' coloration: with chestnut or reddish-brown spots and marks on the costae forming irregular, more or less disconnected axial undulate or zigzag flames; very obvious in beach-worn specimens, but more or less obscured by the periostracum in fresh specimens.

Radula with 100–115 rows, central plate twice as broad as long, with 5–6 denticles, the 6th being sometimes minute, lateral with trifid inner cusp, the opposing margins of the 2 inner points feebly serrulate. (Cooke's description and figure incorrect—see Peile 1938.)

Living: Still Bay and East London (Stephenson 1947); False Bay, Hermanus, Mossel Bay, Jeffreys Bay, Port Elizabeth (U.C.T. Ecol. Surv.); False Bay, 9 fathoms, and off Cape St. Blaize, 17 fathoms (S. Afr. Mus. P.F. coll.); Saldanha Bay (west coast) (U.C.T.).

Dead: records by previous authors are within the above range. Kalk Bay and Muizenberg (False Bay), Still Bay, Mossel Bay, Port St. Johns, Cove Rock (near East London), and Durban (S. Afr. Mus.); on the west coast: Dassen Island (Table Bay), and Lambert's Bay (S. Afr. Mus.).

Remarks. The above description based on 3 specimens with the 'leonine' coloration from False Bay, one of them identified by Tomlin.

There are plump and slender forms: e.g. 40 × 22 mm., and 41 × 20 mm.; the uniformly coloured 'leonine' examples are mostly plump, the 'tigrine' examples on the other hand tend to be more slender.

Some specimens have faint indications of spots and flames and constitute transitions between the 'leonine' and 'tigrine' forms.

Sowerby had one specimen, 50 × 24 mm., for his description of *semisulcata*. His figure is not good, because the subsutural groove is drawn too deep, simulating a sunken suture, whereas the actual suture lies above the upper series of nodules. There appear to be no later records of this form.

Five beach-worn specimens (S. Afr. Mus. Ross-Frames coll.), however, seem referable. On the 4th and 5th whorls the gradually disappearing axial ribs give a beaded appearance to the subsutural costa, and less obviously to the shoulder below the groove; but eventually they disappear completely. The sculpture of the early whorls resembles that of *tigrina*. 56 (apex and end of rostrum worn) × 24 mm.; smallest 25 × 13 mm.

Variation. In four 'leonine' specimens from Muizenberg (False Bay) (S. Afr. Mus. no. A4936), largest 38 mm. long, the early whorls are cancellate-nodulose, but on 4th and 5th whorls the nodules become very feeble and eventually obsolete, the subsutural costa is only slightly developed, the subsutural groove is scarcely concave; the major costae (3) on body whorl and 5 or 6 of those on base are distinct in one specimen, feeble in another, and scarcely stronger than lirae in the other two.

The Dassen Island specimen (S. Afr. Mus. no. 6886), 28 mm. long, 4 whorls, aperture plicate, has the whorls distinctly nodulose but the nodules peter out on later part of 4th whorl; and each one of the major costae tends to be divided by an incised stria. This latter feature is very noticeable in the Lambert's Bay specimen (S. Afr. Mus. no. 9686).

In two juveniles, 12 and 19 mm. long, from Mossel Bay, only the 1st, 2nd and part of the 3rd whorl are cancellate-nodulose; subsutural costa not developed, major costae merely indicated. Two other slightly larger specimens from the same locality are typical *tigrina* in sculpture and coloration.

In the 'tigrine' form there are on the 5th and 6th whorls usually only 2 costae visible below the subsutural groove; but sometimes the succeeding whorl may recede far enough to expose, partly or wholly, a 3rd costa.

'Cominella' *angusta* Sow.

1886. Sowerby. *J. Conch.*, v, p. 4.
1892. id. *Mar. Sh. S. Afr.*, p. 10, pl. 1, fig. 8.
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 49.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 53.

Aperture shorter than spire. Protoconch ? Postnatal whorls ? (Sowerby: 8 incl. protoconch). Sculpture clathrate; axial riblets 11 on 1st whorl, increasing to 15 on 5th [largest specimen seen by me]; crossed by spiral lirae, 4 on 1st whorl increasing to 6–7 on last whorl, with 8–9 additional ones on base. Columella curved, no parietal callus; no fasciole: outer lip not indented. 12 × 4·75 mm.; Sowerby: 14 × 4; Turton: 15 mm.

Operculum and radula ?

(When fresh) yellowish with reddish spots: 'in a single or double row just below middle of whorl' (Sowerby); one 'on every alternate rib just above the suture' (Turton); (when worn) pure white.

Dead: Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton).

Remarks. S. Afr. Mus. has 2 worn specimens (locality ?) identified by J. H. Ponsonby.

It is very unlikely that this species will prove to be either *Afrocominella* or *Burnupena*. There is no trace of a lip sinus, but the axial ribs and spiral lirae appear to number the same as in *Mangilia ponsonbyi* Sow.; the columella, however, is more curved in *angusta*, and without any trace of the 2 little pleats.

Gen. Euthria Gray

1850. Gray. *Figs. Moll. Anim.*, iv, p. 67.
1917. Cooke. *Proc. Mal. Soc.*, xii, p. 232 (radulae).
1918. Iredale. ibid., xiii, p. 34 (radula)
1929. Thiele. *Handbuch*, i, p. 312.

Remarks. The only South African species whose radula is known is *queketti*; but the figure published by Cooke is incorrect, being based on a mislabelled slide in the Gwatkin collection.

Several South African species have been referred to this genus, but have been transferred to other genera, or even families: *capensis* with syn. *lacertina* and *simonianus*, ? *magellani* and *turton* to *Afrocominella*; *eburnea*, *fuscotincta*, *ordinaria* to *Peristernia* (*Fasciolariidae*); *pura* to *Pyrene* (*Pyrenidae-Columbellidae*); *wahlbergi* to 'Purpura' (*Muricidae*); and *clathrata*, *fallax*, and *formosa* are juveniles placed in *Euthria* by Thiele (1925) with a query.

Key to the species

A. Whorls turreted, with a definite nodulose shoulder.
   1. Shoulder below middle of whorl. Protoconch diam. 1–1·2 mm. 1st whorl with 12 ribs, increasing to 18 nodules on last whorl . . . . *ponsonbyi*
   2. Shoulder at middle of whorl. Protoconch diam. 1·5 mm. 1st whorl with 16–17 ribs, decreasing to 11–13 nodules on last whorl . . . . *queketti*

B. Profile of whorls straight, without shoulder . . . . . *filmerae*

Euthria ponsonbyi Sow.

Fig. 33

1889. Sowerby. *J. Conch.*, vi, p. 149, pl. 3, fig. 3.
1892. id. *Mar. Sh. S. Afr.*, p. 4, pl. 1, fig. 12.

Protoconch 2½ whorls, diam. 1–1·2, alt. 0·8–1 mm. (relatively higher than in *queketti*), smooth. Postnatal whorls 7; 1st whorl with 12 ribs, often obscure, increasing regularly to 16 on 6th and 18 on last whorl, on the later whorls ceasing to be ribs and becoming merely nodules around the shoulder; crossed by fine spiral lirae on early whorls, traceable on later whorls between suture and the shoulder nodules, but becoming obliterated by the growth-lines; suture close under nodules, i.e. shoulder below middle of whorl, profile above shoulder concave; on base in juv. 7–8 feeble lirae with fine intermediaries, in older examples only a few barely traceable (Sowerby: 'subobsolete') grooves. Parietal callus obscurely dentiform, canal as long as rest of aperture, narrow, with feeble fold at base, recurved, outer lip internally smooth (Sowerby: 'subobsolete liratum'). 44 × 20 mm. (protoconch and outer lip broken, canal strongly reflexed so that its tip is not the most anterior part of the shell).

Operculum and radula unknown.

White, irregularly suffused with brown and with brown flames between the nodules.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton). St. Sebastian Bay, 27 fathoms, one juv.; off East London, 34 fathoms, one; off Umhlangakulu River (Natal), 50 fathoms, one (all dead) (S. Afr. Mus. P.F. coll.).

Remarks. The details of the sculpture on the early whorls distinguish this species from *queketti*, together with other characters. In Sowerby's figure the concavity of the profile above the shoulder nodules seems slightly exaggerated. The type was a worn specimen with incomplete canal.

The largest P.F. specimen was obtained in Natal waters; the juvenile, 18 mm. long, in St. Sebastian Bay.

Euthria queketti Smith

Figs. 31(*i*), (*j*), 33

1901. Smith. *J. Conch.*, x, p. 110, pl. 1, fig. 1.
Not 1917. Cooke. loc. cit., p. 234, fig. 7 (radula, err. = *Afrocominella*).

Protoconch 2½ whorls, diam. 1·5–1·75, alt. 1–1·25 mm. (relatively lower and broader than in *ponsonbyi*), smooth. Postnatal whorls 7; 1st whorl with 16–17 ribs, decreasing to 12 (11–13) on last whorl, but from about 3rd whorl onwards ceasing to be ribs, becoming nodules around the shoulder, increasing in prominence on later whorls; crossed by spiral lirae 4 on 1st whorl producing a clathrate sculpture, on 2nd only 2 lirae but numerous fine striae, which become very fine on 4th or 5th whorl and visible only above the shoulder, finally petering out, obscured by the growth-lines; base smooth, with growth-lines but only very faint indications of spiral lirae; shoulder at middle of whorl, profile above concave, below straight or slightly convex. Parietal callus dentiform, canal longer than rest of aperture, narrow, with nodule or angular ridge at its base, recurved, outer lip internally smooth. 55 × 24 mm. Smallest specimen seen 17·5 × 8·5 mm.

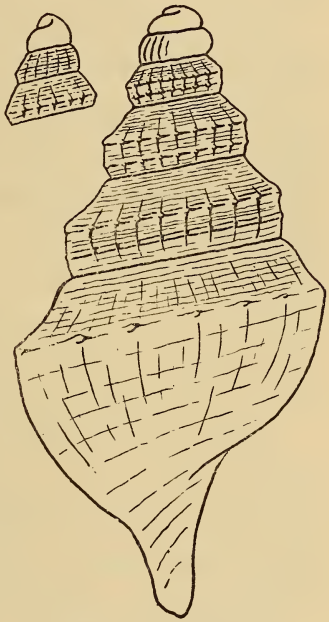

Fig. 33.
Euthria queketti Smith, juvenile 17·5 mm., with protoconch of *E. ponsonbyi* Sow. for comparison.

Operculum broadly oval, nucleus apical, incurved, 14 × 8 mm. in 55 mm. shell.

Creamy-white, irregularly suffused with brown, and with brown flames, shoulder nodules pale, operculum deep amber-brown.

Radula with *c.* 160 rows, central plate triangular, length a little less than basal width, with 3 cusps, the middle one longer than its neighbours, lateralplate with outer cusp larger than the inner.

Off Durban, 40 fathoms [from fish stomachs] (Smith; also S. Afr. Mus. Ross-Frames coll.).

Off Umhlangakulu River (Natal), 50 fathoms, 1 dead, 1 living; off Umhloti River (Natal), 40 fathoms, 1 juv.; off Cone Point and off O'Neil Peak (Zululand), 34 and 55 fathoms, 1 each, dead; Algoa Bay, 25 fathoms, 1 living (S. Afr. Mus. P.F. coll.).

Remarks. The size and shape of the protoconch and the sculpture of the early whorls are important features distinguising this species from *ponsonbyi*. Also, in *queketti* the ribs decrease in number, whereas in *ponsonbyi* they increase. Cooke's figure of a radula ascribed to *queketti* is due to some mistake; it is

certainly that of an *Afrocominella*. The true radula is very like that figured by Cooke for *E. cornea*, but with the central plate more like that figured for *linea*, and the lateral plate with a slightly larger outer cusp.

It is curious and suggestive that Thiele (loc. cit., p. 312) gave the distribution of *cornea* as 'Mittelmeer bis Südafrika'; I am not aware that *cornea* has ever been recorded from South Africa. Compared with a shell of *cornea* in S. Afr. Mus. (ident. Tomlin) *queketti* is broader and less fusiform owing to the stronger nodulose shoulder, and has a longer canal; but Smith (loc. cit., p. 111) said *queketti* was more 'slender'!

The presence of this species in Algoa Bay is rather unexpected; the P.F. specimen is the only one, dead or alive, known from west of Natal.

The juvenile, 17·5 × 8·5 mm. with protoconch and 4 whorls (fig. 33), appears at first sight very different from the adult, because the prominent nodules around the shoulder are developed only on the last two, or three, whorls. The size and squatness of the protoconch, and the sculpture of the early whorls agree exactly with older examples and leave no doubt as to its identity. There is just a hint on the back of the outer lip of the nodules to come.

Euthria filmerae Sow.

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 1, pl. 1, fig. 3.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 54.

Profile of whorls straight, without shoulder. Protoconch 1½ whorls, diam. not quite 2 mm., smooth. Postnatal whorls 8; 1st whorl with 12–14 axial ribs, decreasing to 7 on last whorl; crossed by numerous spiral grooves, 4 on 1st whorl increasing to 11–13 on last whorl, 13–15 additional ones on base. Parietal callus nodiform, canal rather long, open, oblique, outer lip thin, internally smooth. 40 × 14 mm. (living); 47 × 16 mm.

Operculum unguiform, nucleus apical, incurved, 13·5 × 4 mm. in 40. mm. shell.

Lower part of body whorl below periphery white, rest of shell brown.

Dead: Pondoland (Sowerby, also S. Afr. Mus.); Port Alfred (Turton).

Off Itongazi River (Port Shepstone area, Natal), 24 fathoms, one living; off Amatikulu River (Zululand), 25 fathoms, one dead (S. Afr. Mus. P.F. coll.).

Remarks. The living and dead P.F. specimens both have a very thin shiny periostracum (like a coating of white-of-egg). The former retains the operculum, but most unfortunately the animal was not preserved.

Fam. *PYRENIDAE*

1902. Pace. *Proc. Mal. Soc.*, v, pp. 36–154 (*Columbellidae*, list of species).
1929. Thiele. *Handbuch*, i, p. 302 (*Columbellidae*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 436.

Tomlin correctly takes the oldest genus to form the family name.

'. . . it is a matter of considerable difficulty to satisfactorily subdivide the

Columbellidae into genera and subgenera; and the difficulty has been much increased by the misdirected efforts of the mere conchologist . . . whatever value a section may have originally possessed, its true significance has in most cases been entirely lost sight of by subsequent authors, and species have been scattered about among the various genera and subgenera in an amazingly haphazard fashion' (Pace, p. 40). For example, *apicata* was put into *Nitidella* by Smith, but into *Alia* by Bartsch.

Thiele admits four genera, each with a distinctive radula. So far as is known the South Africa species fall into *Pyrene* and *Columbella*.

The lateral plate of the *Pyrene* radula is tricuspid: one cusp about midway on the plate, varying slightly according to the species (e.g. *filmerae*, *burnupi*, *albuginosa*, fig. 34), and separated by a varying distance from the two apical falcate cusps. In the available South African material the only radula of the *Columbella* form is that of *fulgurans*, the lateral plate of which is also tricuspid, but only the apical one is falcate, the other two being broad, like shark's teeth.

Species dealt with here, but whose radulae are unknown, are included in 'Columbella'.

The identification of the smaller species, e.g. Thiele's species from the *Valdivia* collection, is often difficult; and suggested synonymies are provisional.

Pyrene albuginosa (Rve.)

Fig. 34(*f*)

1859. Reeve. *Conch. Icon.*, sp. 223.
1921. Sowerby. *Proc. Mal. Soc.*, xiv, p. 126, fig. (*approximata*).
1926. Tomlin. *Ann. Natal Mus.*, v, p. 291, pl. 16, fig. 5 (*Mitrella natalensis*).
1931. id. ibid., vi, p. 436 (*Mitrella approximata*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 72 (var. *major*, nom. preocc.).
1933. id. *J. Conch.*, xix, p. 370 (nom. nov. var. *rietensis*).

Protoconch 2½–3 whorls (junction with 1st postnatal whorl indistinct), alt. 0·75, diam. 0·5 mm., smooth. Postnatal whorls 7; no axial or spiral sculpture, except *c.* 10–11 lirae on lower half of base and rostrum. Outer lip thickened, *c.* 6 plicae within; columella with 4–6 granules. Periostracum thin, crinkly, scarious. 12 × 4·5 mm.

Pale corneous, uniform, or mottled or reticulated with fawn or orange-brown, usually an interrupted subsutural band, and 2 spiral series (one peripheral, one infraperipheral) of opaque white spots enclosing between them a pale non-reticulate band; some specimens uniform with only a pale peripheral band. Periostracum usually pale, but sometimes amber-brown.

Radula with *c.* 225 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp rather strong.

False Bay to Algoa Bay, Port Alfred, East London, and Natal (auct. and S. Afr. Mus.). Natal (*natalensis*).

Off Cape Vidal (Zululand), 80–100 fathoms, one; off Morewood Cove, Tongaat, Umhloti, and Umhlanga (Natal), 22–36 fathoms, 14; off Umkomaas

River, 40 fathoms, 5 juv.; off East London, 20 fathoms, one; all dead but more or less fresh (S. Afr. Mus. P.F. coll.). 29° 38′ S. 31° E., 49 metres (U.C.T.).

Living: False Bay and East London (U.C.T.).

Remarks. The juveniles collected at Still Bay by Dr. Muir clearly show that *natalensis* is a synonym.

Specimens in S. Afr. Mus. labelled *albuginosa* and *floccata* Rve. do not seem very different, except the latter are larger and broader with less tapering spire, and are also more strongly marked with orange-brown blotches and reticulation; both show on the body-whorl 2 spiral series of opaque white spots, enclosing between them a pale non-reticulated band, also usually a series of white spots below the suture (on the upper whorls the peripheral spots just show above the suture of following whorl). Some specimens have more or less regularly spaced, straight or crinkly, axial bars between suture and periphery; some are orange-brown with a pale peripheral band, others uniform orange-brown. Von Martens (1903. *D. Tiefsee Exp.*, vii, pp. 56, 106) mentions uniform 'scarlet-red' examples of *floccata* from Pondoland; and a beach example from Natal in S. Afr. Mus. is reticulate with brown, but has the peripheral band bright pink.

The same mottled and reticulate pattern is found in *C. seychellarum* von Martens (loc. cit., p. 105, pl. 5, fig. 17) which, however, is an even more broadly oval shell than *floccata*.

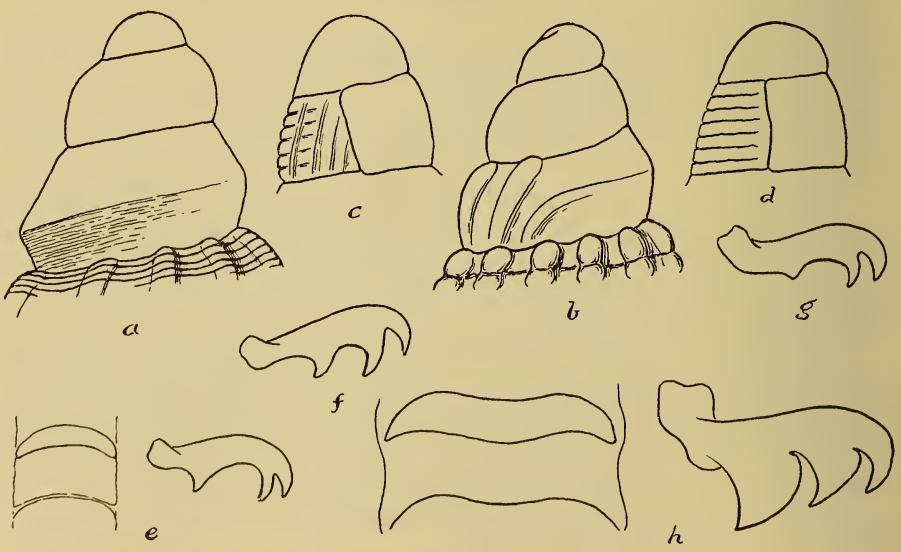

Fig. 34.

Protoconchs of (*a*) *Pyrene kraussii* (Sow.); (*b*) *P. burnupi* (Smith); (*c*) *P. dianae* (Thiele); (*d*) 'Columbella' *hella* Thiele. Central and lateral radula plates of (*e*) *P. burnupi* (Smith); (*f*) *P. albuginosa* (Rve.), lateral plate only; (*g*) *P. filmerae* (Sow.), lateral plate only; (*h*) *Columbella fulgurans* Lam.

A comparison with *apicata* Smith is also not irrelevant. The colour-pattern is very similar, and although the colour is never such a deep brown as in *apicata*, living and fresh *albuginosa* often show a very clear pale brown mottling. *P. albuginosa*, however, does not have a bulbous protoconch, and I have not seen a trace of spiral striae on the last whorl in any specimen.

Pyrene filmerae (Sow.)

Fig. 34(*g*)

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 21 (*sagena*, non Rve.).
1900. id. *Proc. Mal. Soc.*, iv, p. 3, pl. 1, fig. 8.

Protoconch 2 whorls, alt. and diam. 0·8–0·9 mm., smooth, slightly lop-sided. Periostracum forming a crinkled and scarious band below the suture, giving a somewhat coronate or turreted appearance to the spire.

The characteristic (as Sowerby said; but see also *splendidula* Sow.) dark brown band against (below) the suture is usually interrupted by white spots, which may be so large as to disrupt the band into a series of alternating brown and white areas; this is particularly noticeable in the Natal shells, some of which also show triangular brown marks on a white ground instead of the more usual white spots on a brown ground. The dark sutural band is not very obvious in the fresh specimen from Durnford Point, which is cream with, on the body-whorl, a peripheral series of orange-brown spots through which runs a continuous thin white line, a less distinct series of spots on middle of base, protoconch pinkish.

Aperture in living examples violaceous. Periostracum dull brown, obscuring the bright pattern seen in beach examples; in the Durnford Point example pale amber.

Radula with *c.* 200 rows, central plate very delicate, lateral plate apically bifalcate, the proximal cusp small.

Port Elizabeth and Pondoland (Sowerby). Port St. Johns, and Natal (between Durban and Port Shepstone) (S. Afr. Mus.).

Off Durnford Point (Zululand), 13 fathoms, 3 dead, but one with periostracum (S. Afr. Mus. P.F. coll.).

Living: Umgazana (south of Port St. Johns), littoral (U.C.T.).

Remarks. Turton obtained no examples at Port Alfred, and consequently one suspects that the Bairstow and Filmer shells originally came from farther north.

The scarious band of the periostracum is seen in the Umgazana shell, but is more strongly developed in the fresh specimen from Durnford Point. The latter was identified by Sowerby (3rd) as 'probably *splendidula*' (see Sowerby: 1847. *Thes. Conch.*, i, Columbella, pl. 37, figs. 65, 66). If he had seen the other two shells from the same haul, which are obviously worn *filmerae*, he might not have suggested the Philippine *splendidula*.

Some specimens are very similar in pattern to the illustration of *tringa* Sow. (loc. cit., pl. 37, fig. 62).

Pyrene pura (von Martens)

Fig. 35(*a*)

1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 25, pl. 2, fig. 14 (*Euthria p.*).
1925. Thiele. ibid., xvii, p. 173, pl. 30 (18), fig. 21 (*Columbella helena*).
1925. id. ibid., p. 180 (*Euthria p.*).

Protoconch 2 whorls, alt. and diam. 1 mm., smooth (but all specimens worn). Postnatal whorls 5; spire subtending an angle of 35°, profile of whorls gently convex. Growth-lines but no axial sculpture. Fine spiral striae over the greater part of whorl, but (in the present more or less corroded specimens) variable, when traceable *c.* 8 on 3rd whorl, increasing to *c.* 12 on 5th; additional striae on base *c.* 20 (scarcely traceable on rostrum). Outer lip thickened. Periostracum thin. 14 × 6 mm.; 17 × 7·5 mm.

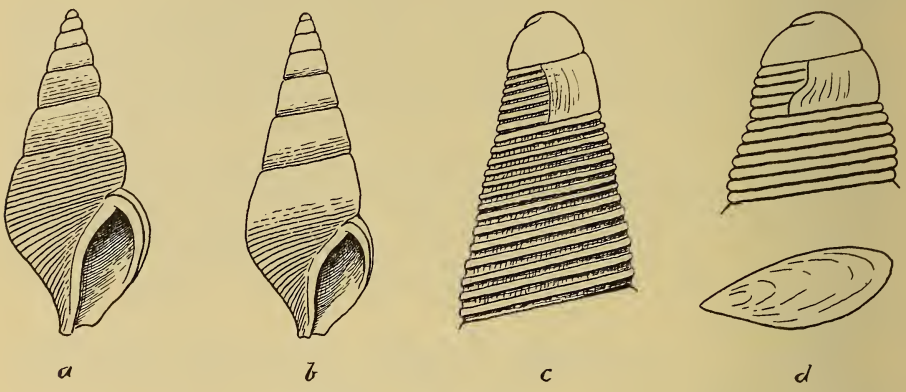

Fig. 35.
(*a*) *Pyrene pura* (von Martens). (*b*) *P. parhelena* n. sp. (*c*) 'Columbella' *polyarosus* n. sp., apex. (*d*) 'Columbella' *confertilirata* n. sp., apex and operculum.

White; two shells with very faint indications of subsutural brown spots and even fainter peripheral marks. Periostracum pale buff or yellowish.

Radula with *c.* 200 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp moderately strong, separated rather widely from the apical cusps.

34° 31′ S. 23° 2′ E., 500 metres (von Martens: one); 35° 16′ S. 22° 26′ E., 155 metres (Thiele: one *pura*, 2 *helena*).

Cape Point NE. ¼ N. 18 miles, 135 fathoms, one living; Vasco da Gama Peak N. 71° E. 18 miles, 230 fathoms, one dead; Lion's Head N. 67° E. 25 miles, 131–136 fathoms, 2 dead; 10 dead without precise locality (S. Afr. Mus. P.F. coll.).

Remarks. These shells are clearly referable to von Martens's species. Thiele separated as *helena* two out of three shells taken in the same locality, seemingly because these two showed spiral striae only on the lower part of the whorl. His figure of *helena* resembles that of *pura* in shape.

Pyrene parhelena n. sp.

Fig. 35(*b*)

Protoconch 2 whorls, alt. 1·25, diam. 1 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 5; spire subtending an angle of 30°, profile of whorls nearly straight; growth-lines but no axial sculpture. Extremely fine spiral striae over whole whorl, from 3rd whorl stronger striae appear on lower half of each whorl, 4–5 on 3rd whorl, increasing to 6–7 on 5th; additional striae on base *c.* 20. Outer lip thickened submarginally. Periostracum thin. 14 × 5 mm.

Pale fawn with faint white spots; periostracum pale.

Radula with *c.* 200 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp moderately strong, well separated from apical cusps.

Cape St. Francis NE. × E. ½ E. 36 miles, 70 fathoms, one dead; Cape St. Blaize N. × E. 73 miles, 125 fathoms, one living, 3 dead (S. Afr. Mus. A8869, A8870 (Type). P.F. coll.).

Remarks. Similar in shape to *barbara* Thiele 1925, but with different sculpture; sculpture similar to that of *helena*, but shape different.

Pyrene kraussii (Sow.)

Fig. 34(*a*)

1844. Sowerby. *Proc. Zool. Soc. Lond.*, p. 53 (*Columbella k.*).
1847. id. *Thes. Conch.*, i, Columbella, sp. 99, p. 144, pl. 40, figs. 180, 181.
1848. Krauss. *Südafrik. Moll.*, p. 109, pl. 6, fig. 11 (*Mangelia fulgurans*).
1848. id. ibid., p. 122, pl. 6, fig. 17 (*cereale* Menke in litt.).
1860. Gould. *Proc. Bost. Soc. Nat. Hist.*, vii, p. 334 (*fulminea*).
1894. Sowerby. *J. Conch.*, vii, p. 7 (*kitchingi*).
1897. id. *Append. Mar. Sh. S. Afr.*, p. 10, pl 6, fig. 3 (*kitchingi*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 56, pl. 37, fig. 5 (*alfredensis*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 436.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 70, pl. 17, no. 500 (var. *albanyana*).
1932. id. ibid., p. 70, pl. 17, no. 504 (*helena*, non Thiele).

Protoconch 2½–3 whorls, alt. and diam. 0·5 mm., smooth, last whorl feebly keeled, with minute spiral striae below the keel (seen only in unworn examples), the keel runs down obliquely at junction with 1st postnatal whorl. Postnatal whorls 4–5; axial ribs 10 on each whorl.

Radula with 110–150 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp rather strong (cf. *albuginosa*). (*kraussii* and *kitchingi* forms examined.)

Table Bay, and False Bay to Durban and Tongaat (S. Afr. Mus.). Off East London, 32 fathoms (S. Afr. Mus. P.F. coll.).

Living: Port Nolloth, Langebaan (Saldanha Bay), False Bay, and Knysna (U.C.T.).

Remarks. Sowerby (1892, p. 4) doubted whether *fulgurans* was a Pleurotomid, and Turton (1932) listed it definitely as a *Columbella*, probably after con-

sultation with Tomlin. I have seen examples from Knysna (Krauss's type locality), including plump (*kraussii*) and slender (*fulgurans*) forms.

Turton's name *helena* is preoccupied by Thiele, but the two are quite different species (cf. *pura*). Turton said his *helena* had no zigzag lines, but his photograph shows them.

Although the characteristic zigzag lines are usually present and easily visible, in some specimens they are obscured by a uniform chestnut-brown coloration, with sometimes a series of pale spots below the suture and another below the periphery (*kitchingi*).

The Durban specimens, taken alive by Burnup, are more delicate and translucent than specimens from other parts of the coast, especially the uniform brown *kitchingi* form from False Bay and the west coast.

aberr. *io* Bartsch

1915. Bartsch. loc. cit., p. 57, pl. 37, fig. 4.
1931. Tomlin. loc. cit., p. 436 (as *kraussii* aberr.).

Tomlin regarded *io* as an abnormal *kraussii*. It is more slender even than the *fulgurans* form. Although I have seen no similar aberration among the numerous examples from False Bay and Still Bay, there is one specimen taken together with two *kraussii* at Tongaat which agrees with Bartsch's description and figure.

Protoconch 2 whorls (but worn), diam. 0·5 mm., smooth. Postnatal whorls 5; 1st whorl worn, 2nd and 3rd each with 10 axial ribs, but evanescent towards end of 3rd whorl, protractive as in *kraussii* (Bartsch said retractive, but see his figure), obsolete on 4th and 5th whorls. 7 × 2·5 mm.

Translucent, with orange-brown zigzag axial lines.

Port Alfred (Bartsch; one specimen; Turton: 'rare'). Tongaat (Natal), one specimen (S. Afr. Mus.).

Pyrene burnupi (Smith)

Fig. 34(*b*), (*e*)

1901. Smith. *J. Conch.*, x, p. 112, pl. 1, fig. 2 (*Columbella b.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 67, pl. 16, no. 488 (*Columbella kowiensis*).

Protoconch 3 whorls, alt. 0·6, diam. 0·5 mm., smooth, last whorl with feeble peripheral keel which runs down obliquely at junction with 1st postnatal whorl. Postnatal whorls 3–4; axial ribs 12–13 on 1st whorl, 13–14 (15) on 2nd–4th; crossed by spiral lirae 4 on 1st whorl, 5 on 2nd, 6–7 on 3rd and 7–8 on 4th, additional lirae on base 9–10; intersections forming rounded granules or beads. 4·5 × 1·5–1·75 mm.

Translucent yellowish, 3–4 red-brown interrupted lines (on the spiral lirae) around middle of whorl, lower part of base also with dark lines or spots.

Radula with *c.* 200 rows, central plate delicate, lateral plate apically bifalcate, proximal cusp well separated from the apical cusp.

Natal (Smith); Port Alfred (Turton).

Living: Durban and Scottburgh (S. Afr. Mus. coll. Burnup).

Pyrene langleyi (Sow.)

1897. Sowerby. *Append. Mar. Sh. S. Afr.*, p. 10, pl. 8, figs. 8, 9 (*Columbella l.*).

Protoconch 2 whorls, alt. 0·6, diam. 0·5 mm., smooth. Postnatal whorls 4 (*natalensis*: 5); growth-lines but no axial ribs, occasionally a thickened growth-line simulates a rib; no spiral sculpture except some (*c.* 10) obscure striae on base. 4·5 × 2 mm.

Corneous-brown, uniform or with 2 series of white spots, one infrasutural, one from top of aperture.

Radula with *c.* 200 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp strong, well separated from apical cusps (cf. *burnupi*).

Port Elizabeth (Sowerby); Port Alfred (Turton); Kalk Bay and Buffels Bay (False Bay) (S. Afr. Mus.).

Living: False Bay (U.C.T.).

Pyrene lightfooti (Smith)

1901. Smith. *J. Conch.*, x, p. 112, pl. 1, fig. 3 (*Columbella l.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 67, pl. 16, no. 487 (var. *assimilans*).

Protoconch 2 whorls, alt. and diam. 0·8 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 3. Axial ribs, when present, *c.* 15 on 1st whorl, *c.* 17 on 2nd, *c.* 17–19 on 3rd; crossed by spiral lirae 7 on 1st whorl, 8 on 2nd, 9–10 on 3rd, additional lirae on base 18–20; lirae flattened, broader than the sulci. 7 × 3 mm.; plump example 6 × 3, slender 6·5 × 2·5 mm.

Living: yellowish, each lira castaneous brown, including those on base, seldom interrupted, a series of pale subsutural spots. Beach examples: pale buff, 5–7 orange-brown interrupted lines (on the lirae), the interruptions occurring so as to delimit a series of oblong brown patches; base also with brown lines.

Radula with *c.* 150 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp strong, separated from the apical cusps but not so distant as in *burnupi*.

Kalk Bay (False Bay) (Smith, and S. Afr. Mus.); Port Alfred (Turton). Off East London, 22 fathoms, 3 dead (S. Afr. Mus. P.F. coll.).

Living: Algoa Bay, 60 fathoms (U.C.T.).

Remarks. If the condition of the type (types) in British Museum was no better than that of the cotypes in S. Afr. Mus., it is not surprising that Smith's description did not mention the axial ribs. They are, however, very low and rounded, and though usually developed on 1st and 2nd whorls, are frequently obsolete on the 3rd.

R. M. Lightfoot of the South African Museum found several dead specimens at Kalk Bay, but the species has not been found living in False Bay by U.C.T. There are no specimens in the Muir collection from Still Bay.

Pyrene atrata (Gould)

1903. Smith. *Proc. Mal. Soc.*, v, p. 374 (*Columbella a.*).
1910. Schwarz. *Tr. Geol. Soc. S. Afr.*, xii, p. 115.

Radula (Durban specimen) with *c.* 150 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp strong, well separated from the apical cusps.

Fossil: Pleistocene, Port Elizabeth (Schwarz).

Living: Durban (Smith). Morrumbene estuary, Inhambane, and Maxixe, Portuguese East Africa (U.C.T.).

One of the Inhambane specimens, 3·3 × 1·75 mm., resembles very closely the figure of *padangensis* Thiele (1925. *D. Tiefsee Exp.* xvii, p. 327, pl. 31 (19), fig. 19) both in form and coloration.

P. atrata occurs in several forms in the Indo-Pacific region.

Pyrene dianae (Thiele)
Fig. 34(*c*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 176, pl. 31 (19), fig. 13 (*Columbella d.*).

Protoconch 1½ whorls, alt. and diam. 0·75 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 3–3½; axial ribs on 2nd whorl *c.* 22–24, on 3rd *c.* 28–30; spiral lirae 6 on 1st whorl, 8 on 2nd, 10 on 3rd; additional lirae on base *c.* 18. 5 × 2 mm.; Thiele: 4·5 × 1·8 mm.

Radula with *c.* 200 rows, central plate very delicate, lateral plate apically bifalcate, proximal cusp strong, well separated from the apical cusps.

34° 51′ S. 19° 37′ E., 80 metres, one (Thiele).

Off Cape St. Blaize, 125 fathoms, one (S. Afr. Mus. P.F. coll.).

Living: 34° 18′ S. 18° 30′ E. (False Bay), 51 metres (U.C.T.).

Columbella fulgurans Lam.
Fig. 34(*h*)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 296.
1859. Chenu. *Man. Conchyl.*, i, fig. 1076.

Radula with 130–140 rows, central plate wide, arcuate, lateral plate tricuspid, the proximal cusp the largest, the apical one falcate.

Living: Mozambique Island (U.W.).

'Columbella' *pyramidalis* Sow.

1894. Sowerby. *J. Conch.*, vii, p. 370.
1897. id. *Append. Mar. Sh. S. Afr.*, p. 10, pl. 6, fig. 4.
1904. Smith. *J. Malac.*, xi, p. 22 (*adjacens* n. sp., listed, sine descr.).

1931. Tomlin. *Ann. Natal Mus.*, vi, p. 437.
1932. Turton. *Mar. Sh. Pt. Alfred*, pp. 70, 71 (*pyramidalis* and var. *fusca*).
1932. id. ibid., p. 71, pl. 17, no. 509 (*adjacens*), and pl. 17, no. 510 (*distincta*).

Port Elizabeth and Port Alfred.

Off Cove Rock and East London, 22–32 fathoms (S. Afr. Mus. P.F. coll.).

'Columbella' *eulimoides* Turton

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 71, pl. 17, no. 511.

Two dead specimens (one very worn) appear referable to this species and confirm its validity. They are more slender than *pyramidalis*, with a longer base and rostrum. The larger measures 8 × 2·5 mm., with 5 postnatal whorls. The nuclear apex (? if this is the actual nucleus) alt. 0·4, diam. 0·6 mm.

Off Keiskamma River, 33 fathoms (S. Afr. Mus. P.F. coll.).

'Columbella' *apicata* Smith

1899. Smith. *J. Conch.*, ix, p. 247, pl. 5, fig. 2.
1932. Turton. *Mar. Sh. Pt. Alfred.*, p. 71, pl. 17, no. 520 (*rufanensis*); and p. 73, pl. 17, no. 526 (*arcuata*).

Although the general colour pattern is the same as in *filmerae*, the spire is longer and the whorls do not widen so rapidly; in *filmerae* the whorls are much broader and appear as if telescoped.

Three topotypes (S. Afr. Mus. coll. Burnup) lack the distinctive protoconchs; they show on the body-whorl 5–6 fine spiral striae, not mentioned in Smith's description, which said only the base was striate. cf. *Alcira elegans*.

Durban (Smith); Port Alfred (Bartsch, Turton).

Two specimens from Delagoa Bay (U.W.), 9·5 × 3·5 mm. (protoconchs missing) may be this species. Outer lip thickened, plicate within.

One of these shells has the *filmerae* colour pattern, but the other has numerous close-set narrow, straight or slightly crinkly axial stripes, brown on a yellowish ground, about 30 on the body-whorl (cf. *cincinnata* von Martens, 1880. *Mauritius & Seychellen*, p. 248, pl. 20, fig. 14). Margin of outer lip and canal of both shells chestnut-brown.

'Columbella' *mutabilis* Turton

Smith: *lightfooti* var., ined. specimens at Brit. Mus.

1932. Turton. *Mar. Sh. Pt. Alfred*, p. 68, and vars. *multicostata* and *convexa*, pl. 16, nos, 489, 490, 491.

Protoconch 2 whorls, alt. 0·75, diam. 0·5–0·6 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 4; axial ribs 11–12 on 1st whorl, increasing to 13–14 (15) on last whorl; crossed by spiral lirae 5 on 1st whorl, 6 on 2nd, 7 on 3rd, 7–8 on 4th, additional lirae on base 10–12. 7 × 2·75 mm. Buff or fulvous.

Port Alfred (Turton); False Bay and Still Bay (S. Afr. Mus.).

Off Cove Rock and East London, 27–32 fathoms, 4 dead (S. Afr. Mus. P.F. coll.).

Remarks. Turton's var. *convexa* does not seem worth maintaining, but if *multicostata* is retained it must be renamed (preocc. Blankenh. 1901). This may be a composite species, but further and better material is required. If Turton had given an illustration of *consanguinea* Sow. 1897 (included in *Mangilia* by Bartsch and Turton) a comparison with *mutabilis* might have been possible; there seems to be some resemblance, as far as one can judge from Sowerby's figures.

'Columbella' *polyarosus* n. sp.

Fig. 35(*c*)

Protoconch 2 whorls, alt. 1·5, diam. 1·3 mm., smooth, with faint axial pliculae prior to junction with 1st postnatal whorl. Postnatal whorls (largest specimen) 5½; spire subtending an angle of 30°, profile almost straight in early whorls, becoming gently convex later. No axial sculpture, but growth-lines distinct in the spiral sulci, less distinct across the lirae. Spiral lirae 7 on 1st–3rd whorls, 8 on 4th and 5th, additional lirae on base (of 3rd whorl) *c.* 20. Lirae flattened, subequal in width to the sulci. Columella slightly curved. Protoconch plus 3 whorls 11 × 3·75 mm., protoconch plus 5 whorls 22 × (approx.) 7 mm. (Type.)

Cream or buff, the largest specimen with faint orange-brown axial flames.

Off Cape Vidal (Zululand), 80–100 fathoms, one apex; off O'Neill Peak (Zululand), 90 fathoms, one with 3 whorls; off Cape Natal, 54 fathoms, one 22 mm. specimen, but last whorl broken; off Umhloti River, 40 fathoms, one (3 whorls) and 3 fragments; off Hood Point (East London), 49 fathoms, one (2 whorls); off Cape St. Blaize, 125 fathoms, fragment of apex; all dead (S. Afr. Mus. A8875–78, and A8882. Type A8875. P.F. coll.).

Remarks. Has the appearance of a very large *Daphnella sulcata*, with larger protoconch and less deep sutures. The aperture is Columbellid, not like that of *Daphnella*.

'Columbella' *confertilirata* n. sp.

Fig. 35(*d*)

Fusiform. Protoconch 2 whorls, alt. 1, diam. 1·25 mm., smooth, faint axial pliculae prior to the sigmoid junction with 1st postnatal whorl. Postnatal whorls 4, spire subtending an angle of *c.* 35°, profile of whorls gently convex. Growth-lines but no axial sculpture; spiral lirae 5 on 1st whorl, 7 on 2nd and 3rd, 8 on 4th, additional lirae on base *c.* 14; lirae rounded, wider than the sulci. Columella nearly straight. 11 × 4·5 mm.

Operculum narrow ovate, nucleus apical, 2·75 × 1 mm.

Cream or buff, with very faint indications of orange marks; operculum dark brown.

Off Umkomaas River (Natal), 40 fathoms, 2, 2 juv., and fragments (S. Afr. Mus. A8879. P.F. coll.).

Remarks. The shape is similar to that of *Mitromorpha volva*. The two larger specimens have 4 whorls, but some of the fragments indicate that 5-whorled examples with a width of 6 mm. occur.

'Columbella' *adela* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 174, pl. 30 (18), fig. 24.

Four white specimens from Still Bay (Muir coll.) agree with Thiele's description and figure.

34° 51′ S. 19° 37′ E. 80 metres (Thiele). Thiele recorded it also from Great Fish Bay, Angola.

It may be compared with *kincaidi* Tomlin 1926, which is yellowish, and *amphitrite* Turton 1932, which is brown.

'Columbella' *meta* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 175, pl. 31 (19), fig. 3.
1925. id. ibid., p. 175, pl. 31 (19), fig. 12 (*veneris*).

Two dead specimens may be referable to *meta*, though not quite so slender: 6 × 2 mm. as against 7·5 × 2·4 mm.; and with only 5 spiral lirae on 3rd and 4th whorls compared with 6–7 (if Thiele's figure is exact in this detail).

35° 16′ S. 22° 26′ E. 155 metres (Thiele); 34° 51′ S. 19° 37′ E., 80 metres (Thiele: *veneris*).

34° 26′ S. 25° 42′ E. 124 fathoms, one; Cape St. Blaize N. × E. 73 miles, 125 fathoms, one (S. Afr. Mus. A8569 and A8881. P.F. coll.).

C. veneris would seem to be extremely close, if not synonymous.

'Columbella' *brunnescens* Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 175, pl. 31 (19), fig. 2.

Two specimens seem referable to this species, 4·5 × 2 mm. and 5·3 × 2·2 mm.

34° 8′ S. 24° 59′ E. 80 metres; and 33° 50′ S. 25° 48′ E. (depth not recorded) (Thiele).

Off Cape Recife, 56 fathoms; off Cape St. Blaize, 39 fathoms (S. Afr. Mus. A8580, A8581. P.F. coll.).

'Columbella' *hella* Thiele

Fig. 34(*d*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 176, pl. 31 (19), fig. 5.
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 74, pl. 17, no. 531 (*brunescens* [*sic*], non Thiele).

Protoconch 1½ whorls, alt. and diam. 0·5 mm., smooth, junction with 1st postnatal whorl distinct. Postnatal whorls 4–4½; spiral lirae 6–7 on 1st and 2nd whorls, 7–8 on 3rd, 8–9 (10) on 4th, additional lirae on base *c.* 15; lirae flattened, wider than the sulci. 6 × 2 mm.; Thiele: 6·5 × 2·25 mm.

Buff or fawn, protoconch glossy brown; the Natal specimen is glossy cream (presumably fresher than the others).

35° 16′ S. 22° 26′ E., 155 metres, one (Thiele). Port Alfred, two (Turton).

Off Illovo River (Natal), 27–30 fathoms, one; off East London, 32 fathoms, 12; off Nieca River (East London area), 43 fathoms, 2; off Keiskamma River, 33 fathoms, one; off Great Fish Point, 51 fathoms, one; 34° 5′ S. 25° 55′ E., 67 fathoms, 6; all dead (S. Afr. Mus. P.F. coll.).

Remarks. Fortunately Turton's *brunescens* [*sic*] seems to be the same as *hella*, otherwise it would require a new name.

'Columbella' *vitula* n. sp.

Fig. 36(*a*)

Juv. Protoconch 1½ whorls, alt. 0·5, diam. 0·6 mm., smooth, a few fine pliculae prior to the indistinct junction with 1st postnatal whorl. Postnatal whorls 2½; axial ribs *c.* 20–22 on each whorl, slightly protractive, evanescent on base, tops of ribs forming granules separated by a spiral groove; crossed by spiral lirae 4 on 1st whorl, 5 on 2nd, more distinct in the intervals between the ribs, additional lirae *c.* 12 on base (obscure on rostrum). 3·5 × 2 mm. Pale buff.

Off Cove Rock (East London), 80–130 fathoms, one juv. (S. Afr. Mus. A8887. P.F. coll.).

Remarks. Although only a juvenile, the sculpture seems distinct and recognizable enough to justify a specific name, suggested by proximity to the Buffalo River at East London.

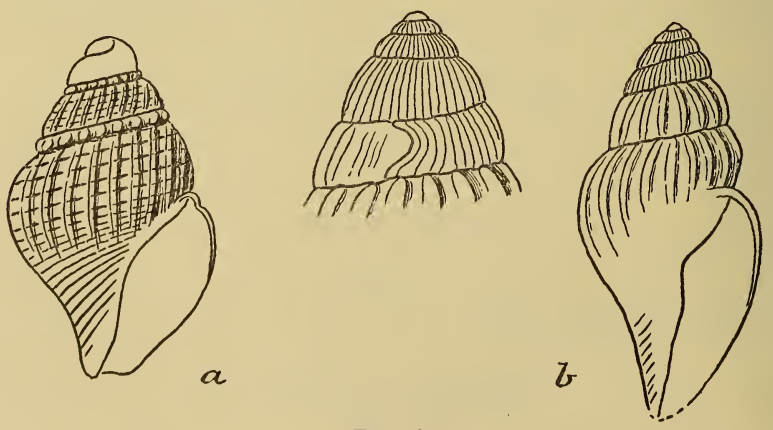

Fig. 36.

(*a*) 'Columbella' *vitula* n. sp. (*b*) 'Columbella' *sigma* n. sp., with protoconch further enlarged.

Resembles *C. chuni* Thiele (1925. *D. Tiefsee Exp.*, xvii, p. 176, pl. 31 (19), fig. 6) from the Zanzibar area, 404–463 metres, in having a subsutural groove interrupting the ribs, but has more ribs.

Thiele's description of the radula indicates that *chuni* is a *Pyrene*; the present species probably also belongs to this genus.

'Columbella' *sigma* n. sp.

Fig. 36(*b*)

Protoconch 5 whorls, alt. and diam. 0·75 mm., nucleus smooth, whorls with close-set pliculae, junction with 1st postnatal whorl strongly sigmoid. Postnatal whorls 2½, profile convex, very slightly shouldered; axial ribs 14 on 1st whorl, 15 on 2nd, 8 on the last half whorl, from suture to suture, evanescent on base of body-whorl. No spiral sculpture except about 8 lirae on lower part of base and rostrum (the tip of the rostrum seems to be worn). Columella slightly angular at midway. 4 × 2 mm.

Pale corneous, an opaque white band around shoulder and a disconnected series of small white streaks from top of aperture, protoconch fawn.

Off Cove Rock (East London area), 22 fathoms, one (S. Afr. Mus. A8890. P.F. coll.).

Remarks. Among the known protoconchs of South African species this seems quite distinctive. Perhaps not a Columbellid.

Fam. *RAPIDAE*

1929. Thiele. *Handbuch*, i, p. 300 (*Magilidae*).

The family is characterized, as far as is known, by the absence of a radula.

Although Thiele adopted the family name *Magilidae* in place of *Coralliophilidae*, the oldest genus is *Rapa* Montfort 1810.

Gen. Latiaxis Swainson

1935. Tomlin. *J. Conch.*, xx, pp. 180–3 (list of Recent species).

Rapana fritschi von Martens was included in *Latiaxis* by Tomlin (1923, 1935). Owing to a mistaken identity I removed it to *Tritonalia* (*Muricidae*) (1957), but now return it to the present family in the genus *Coralliophila* (*v. infra*).

Smith considered that his *Latiaxis rosaceus* (1903) might, conchologically, equally well be put into *Coralliophila*, but I leave it where Smith originally put it.

No further examples of *L. tortilis* or *L. capensis* Tomlin 1928 have been found in the P.F. bottom samples recently examined, but the search was rewarded by one example of a remarkable species which appears to be new.

Latiaxis rosaceus Smith

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 16 (*nodosus*, non Adams).
1903. Smith. *Proc. Mal. Soc.*, v, p. 376, pl. 15, fig. 16.
1923. Tomlin. *J. Conch.*, xvii, p. 46 (as syn. of *fritschi*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 78.
1935. Tomlin. loc. cit., p. 183 (as syn. of *fritschi*).

Aperture (incl. canal) about $1\frac{1}{3}$ times spire. Protoconch 2 whorls, alt. 1, diam. 1·3 mm., smooth. Postnatal whorls 4, profile angularly shouldered at (or slightly below) middle of whorl. Axial ribs 10 on 1st and 2nd whorls, 10–9 on 3rd and 4th, sometimes only 8 on 4th, usually prominent; spiral lirae 4 on 1st whorl, 6 on 2nd, increasing to 9–10 on 4th, 8–9 additional lirae on base, with intermediaries; main lirae and intermediaries strongly and closely squamulose (also the interstices when visible). Rostrum umbilicate and costate, columella slightly curved, anteriorly with free edge slightly reflexed over umbilicus. Aperture angularly piriform, posterior margin of outer lip oblique to preceding whorl. 18 × 13 mm. Smith: 21 × 13 mm.

Operculum and animal unknown.

Grey, aperture pale violaceous. Beach specimens rose-pink, salmon, or white.

Port Elizabeth, Port Alfred (Smith, Turton); Still Bay and Port Alfred (S. Afr. Mus.).

Off Durnford Point (Zululand), 13 fathoms, one dead but fresh (S. Afr. Mus. P.F. coll.).

Remarks. The above description is from the fresh P.F. specimen measuring 15·5 × 10 mm. This was seen by Tomlin and identified as *fritschi*. Tomlin did not regard *rosaceus* as a distinct species in spite of Smith saying that 'rubro-coccinea' [= *fritschi*] should not be confused with *rosaceus* on account of the difference in shape.

In the Muir collection from Still Bay there are a few specimens whose squat shape and shouldered whorls at once distinguish them from *fritschi*. Approximately equal-sized shells measure: *rosaceus* 15·5 × 11 mm. compared with *fritschi* 16 × 9 mm. I have seen no intergrading examples, and therefore maintain Smith's species.

Latiaxis tortilis H. & A. Adams

Fig. 38(*a*)

1864. H. & A. Adams. *Proc. Zool. Soc. Lond.* (for 1863), p. 431.
1882. Sowerby. *Thes. Conch.*, v, p. 424, fig. 1 (not the Type, see Smith, 1906).
1903. id. *Mar. Invest. S. Afr.*, ii, p. 228.
1906. Smith. *Ann. Natal Mus.*, i, p. 39.
1935. Tomlin. loc. cit., p. 183 (= *gyratus* Hinds 1844).
1942. Yen. *Proc. Mal. Soc.*, xxiv, p. 225.

Spire less than aperture (allowing for the missing protoconch about $1\frac{1}{4}$ times in aperture). Postnatal whorls 5; spire turreted, profile of whorls

angularly shouldered. Sutures undulate. Axial ribs on 1st whorl 9 (somewhat worn), and 2nd and 3rd whorls 9, on 4th 10, on 5th 10 and 11 irregular and interrupted by an injury, broad and rounded, from suture to suture, petering out on base, shoulder keel in apical view undulate; crossed by a strong peripheral keel forming the shoulder, becoming prominent and somewhat laminar and upturned on last whorl at intersections with the ribs; spiral lirae above shoulder keel on 1st and 2nd whorls worn, below shoulder on 1st whorl 2, on 2nd 2–3, on 3rd 4–5 above and 4–5 below, on 4th 6–7 above and 6–7 (8) below, on 5th 8 above and 8–9 below; 20 additional lirae on base; lirae on body-whorl subequal; all lirae closely squamulose. Rostrum costate, with 6–7 squamae. Umbilicus narrow. Aperture plicate within. 43 × 25 mm. (28 incl. shoulder projections). Diameter of broken surface at apex 1·5 mm.

Dirty white, aperture pure white.

Vasco da Gama Peak (Cape Point) S. 75° E., distant 13½ miles, 166 fathoms (Sowerby, 1903) (S. Afr. Mus. A4950. P.F. coll.).

Remarks. The single specimen obtained by the *Pieter Faure* is here described and figured; Sowerby only recorded it.

Sowerby identified it with the Chinese *tortilis*; it was seen by Tomlin, who, however, made no comment on it when he described *L. capensis* (1928. *Ann. S. Afr. Mus.*, xxv, p. 332).

The specific status of *tortilis* seems to be not satisfactorily decided. Sowerby disagreed with Gray in making it a synonym of *idoleum* Jonas; Smith agreed with Gray. Tomlin makes both *idoleum* and *tortilis* synonyms of *gyratus* Hinds 1844; Yen keeps *tortilis* and *gyratus* separate.

The Type of *tortilis* is in the British Museum (Cuming coll.); the original authors stated it had 6 whorls, but gave no size; Yen said it had 7 whorls and measured 38·5 × 25·4 mm., adding that *gyratus* (Type also in B.M.) was a smaller species. The latter statement seems correct: Hinds's figure shows 6 whorls, including protoconch, and measures only 19 mm. long (assuming his figure is natural size). Unfortunately Yen did not figure the two species.

The present specimen with 5 whorls (it is unlikely that another postnatal whorl as well as the protoconch is missing) is larger than the Type of *tortilis*. In the original description the spire was said to equal the aperture; here the aperture is distinctly longer than the spire.

But the present specimen agrees with *tortilis* in having axial ribs ('plicis undulatis distantibus') whereas according to Hinds's description and figure ribs are completely absent in *gyratus*. I prefer, therefore, to follow Yen in recognizing two species, and agree with Sowerby in assigning the present specimen to *tortilis*.

Apart from the specific identity of this specimen, considerable interest attaches to its alleged provenance. Both *gyratus* and *tortilis* were recorded from the East (Macassar Straits and China). A locality on the slope of the continental shelf *west of Cape Point* is indeed surprising.

The labelling of the catches on board the *Pieter Faure* seems to have been careful. Some, but very few, anomalies in the recorded localities have come to light; and these are most likely to have been due to faulty transcriptions of labels when specimens were sent away to specialists.

In the present instance the P.F. label is not available, but the number P.F. 2561 is entered in the S. Afr. Mus. Register book. The *Pieter Faure* log-book gives for this number the locality as recorded by Sowerby (as above), but does not refer to any Gastropods. Probably therefore the number attached to the shell sent to Sowerby was an error; but any suggestion as to what was the correct number is impossible. The original number might have consisted of *five* numerals, and the label got torn. For example, P.F. 12561 refers to a locality off Cape Natal, 185–200 fathoms, which would be far more credible as the provenance of an example of *tortilis*; but even that number refers to other animals in the haul, not Gastropods.

The recorded locality must, therefore, be accepted provisionally, with the hope that future trawling will obtain further examples of this species in South African waters.

Latiaxis kylix n. sp.

Fig. 37

Shell obconic, flat above, spire very short, whorls rapidly expanding. Protoconch 3 whorls, alt. 0.9, diam. 1 mm., on 1st whorl a very feeble keel below middle of whorl, continued a little more conspicuously on 2nd whorl, with an additional very feeble one above, on 3rd whorl the latter obsolete and the lower keel towards end of whorl overlain by the suture of 1st postnatal whorl, very faint axial pliculae visible chiefly on 2nd whorl, junction with 1st postnatal whorl marked by a curved varix. Postnatal whorls 3, 1st forming with the protoconch the spire, feebly keeled, and with fine axial plicae, the later portion sloping away from spire and passing into the nearly horizontal 2nd whorl; 3rd whorl horizontal above, flat but slightly curved upwards at the periphery where there are 12 angular, complanate processes; growth-lines distinct, shortly squamulose at suture with preceding whorl. Base with obscure spiral striae, visible chiefly near rostrum, which is costate, with 6 squamae.

Fig. 37.
Latiaxis kylix n. sp.

Umbilicus deep. Columella sigmoid. Aperture triangular, canal narrow, curved. Alt. 10, diam. maj. 18, min. 12 mm. Pale buff.

Off Cape Natal (Durban), W. × N. distant 6½ miles, 54 fathoms, one dead (S. Afr. Mus. A8850. P.F. coll.).

Remarks. Shape resembling the Greek kylix, a widely open cup.

Only this one specimen was obtained although the *Pieter Faure* carried out several dredgings in the same area. It is in fresh, unworn condition.

Coralliophila fritschi (von Martens)

Fig. 38(*b*)

1874. Von Martens. *Jahrb. D. Malak. Ges.*, i, p. 135, pl. 6, fig. 3 (*Rapana f.*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 16 (*Pseudomurex meyendorffi*, non Calcara).
1903. Smith. *Proc. Mal. Soc.*, v, p. 377 (*rubrococcinea*, non M. & S.).
? 1910. id. *Ann. Natal Mus.*, ii, p. 194, pl. 7, fig. 7 (*fragosa*).
1910. Stebbing. *Ann. S. Afr. Mus.*, vi, p. 356 (*Murex* (*Pseudomurex*) *aëdonius*, non Watson).
1914. Tomlin & Shackleford. *J. Conch.*, xiv, pp. 246-7 (*Pseudomurex meyendorffi*, non Calcara).
1923. Tomlin. *J. Conch.*, xvii, p. 46 (*Latiaxis f.*, not the synonymy).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 76, pl. 18, no. 551 (*Tritonalia semidisjuncta*, = subscalariform aberr.).
1932. id. ibid., p. 79 (*C. fritschi* and *Pseudomurex meyendorffi*, non Calcara).
1935. Tomlin. loc. cit., p. 181 (*Latiaxis f.*, not the synonymy).
Not Barnard. *J. Conch.*, xxiv, p. 180, 1957 = *Tritonalia sperata.*

Protoconch 5 whorls, alt. 1·5, diam. 1·3 mm., 1st whorl smooth, glossy, 2nd smooth but minutely crimped at upper suture, and with faint trace of an incipient spiral keel, 3rd–5th whorls bicingulate, crimped at upper suture indicating incipient axial pliculae, 4th and 5th with numerous axial pliculae, slightly protractive from upper suture, strongly protractive between the two keels, then retractive, but scarcely traceable to lower part of whorl where there is a series of minute beads, the lower keel obscured on last part of last whorl by 1st postnatal whorl, keels minutely beaded where the pliculae cross them, junction with 1st postnatal whorl marked by a varix. Postnatal whorls 3, axial ribs 10 on each whorl, prominent on 1st, and becoming flattened, broader, and indistinct on 3rd; crossed by spiral lirae 4 on 1st whorl, the first 2 not prominent, the 3rd strongest and peripheral, 5 at end of whorl due to interpolation of a thin intermediary below the peripheral lira, on 3rd whorl 7 lirae, the 4th peripheral, but at end of whorl 8 lirae, the 5th being peripheral; 5 additional lirae on base of 1st whorl (juv.), 7 in the 3-whorled specimen; all lirae strongly squamate. Rostrum costate and squamate. Columella nearly straight, slightly rimate anteriorly, a feeble umbilicus. Canal short. Aperture piriform, the posterior margin of outer lip horizontal and almost perpendicular to the preceding whorl. One-whorled 5·3 × 3 mm., 2-whorled 7 × 4·3 mm., 3-whorled 11·5 × 7·5 mm., 4-whorled (minus protoconch) 14 × 9 mm.; beach-worn 27 × 16 mm. Von Martens, 'fere 6' whorls 32 × 20 mm. Smith, *fragosa*, 6 whorls 28 × 14 mm.

Operculum oval-reniform, nucleus on outer margin a little below middle.

Creamy-white, operculum amber. Beach shells pink or white.

Only one animal available: no radula was found.

False Bay (von Martens); Port Elizabeth, Port Alfred, East London (auct.). Still Bay and Tongaat (north of Durban) (S. Afr. Mus.). Off Scottburgh (Natal), 168 metres (Stebbing). Scottburgh (Smith: *fragosa*).

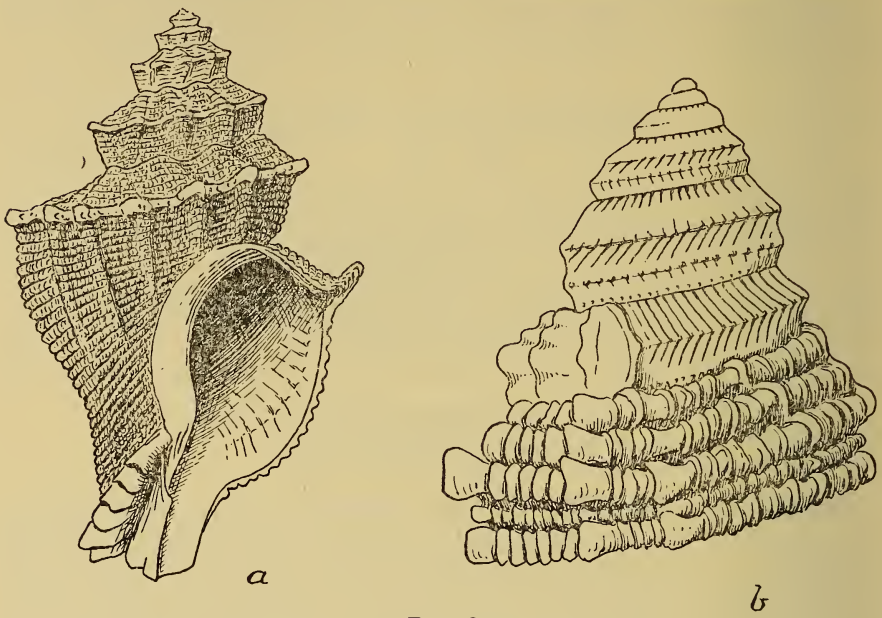

Fig. 38.

(*a*) *Latiaxis tortilis* H. & A. Adams. (*b*) *Coralliophila fritschi* (von Martens).

Off Cape Natal (Durban), 54 fathoms, 1 living, 2 juv.; off Tugela River, 65–80 fathoms, 1 juv.; off Umkomaas, 40 fathoms, 3 and 3 juv.; off Sandy Point (north of Kei River), 51 fathoms, 1 juv.; off Cove Rock (East London), 22 fathoms, 2 juv.; 33° 3′ S. 27° 57′ E., 32 fathoms, 1 juv.; 34° 5′ S. 25° 55′ E., 67 fathoms, 3 juv.; 34° 27′ S. 25° 42′ E., 256 fathoms, 1 juv.; all dead except one (S. Afr. Mus. A8858—A8865. P.F. coll.).

Kosi Bay, and 33° 37′ S. 26° 56′ E., 46 metres (U.C.T.).

Remarks. Von Martens gave a recognizable description and figure of a worn shell (which probably explains why he did not say the lirae were squamose), which can be matched without any ambiguity by numerous beach shells from Still Bay (Muir coll.) and Port Alfred in S. Afr. Mus. It seems strange that the name of a Persian Gulf species (*rubrococcinea*) should ever have been dragged into the South African fauna-list.

There is a tendency to subscalariformity, exemplified by two (out of 30) of the Still Bay shells, which measure (apices worn, only 2nd–5th whorls present) 24 × 12 and 22 × 13 mm. There are 9 axial ribs traceable on the

last whorl in both specimens. Turton's *Tritonalia semidisjuncta* is obviously another example. Von Martens compared the general shape of *fritschi* with *Purpura* (*Rapana*, *Coralliophila*) *scalariformis* Lam.

The single shell from Tongaat measures 15 × 9 mm. (4 whorls protoconch missing) and has the convex, non-shouldered profile of *fritschi*, though the spire is rather short. It is not a *rosaceus*.

Stebbing referred a Natal Hermit-crab to the Tristan species *Eupagurus tristanensis*, stating that it inhabited the same species of shell: *Murex* (*Pseudomurex*) *aëdonius* Watson. In general appearance there is certainly much similarity between *aëdonius* and *fritschi* (and *fragosa*), but the former has fewer (8) axial ribs. Stebbing did not return the shell with the crab, but I think there is no doubt that it was an example of *fritschi*. (The crab was later referred to an Indo-Pacific species, not the Tristan species.)

I strongly suspect that *fragosa* is only a slender form of *fritschi*, with 9 axial ribs (as in the above subscalariform examples), less convex profile, and posterior margin of the outer lip oblique. Smith said the spiral lirae numbered about 14 on the penultimate and about 36 on the body whorl; the figure shows only 6 and 20 respectively, which agrees very nearly with the number in normal *fritschi*; but possibly the artist did not insert all the fine intermediaries.

The shape of the shell and of the aperture indicate that the above described 3-whorled shell and the juveniles are indubitably *fritschi*. The details of the axial ribs and spiral lirae are the same, though in 5-whorled shells the lirae may increase to 8–9, with 7–8 additional ones on base, and the anterior part of the columella is slightly reflexed over the umbilicus.

Among the beach-worn shells from Still Bay (Muir coll.) is one 4-whorled shell which shows the curved varix at end of the protoconch, preceded by a faint indication of a spiral keel.

The presence of 13 protoconchs in 8 bottom-samples, and one living specimen, in the area between Durban and Algoa Bay, shows that this is by no means a rare species. Beach examples are fairly common within the same area. The species is probably a rock dweller, and this may explain why the *Pieter Faure* obtained only one living example, because she avoided the rough ground and used a fishing-trawl more often than a dredge.

Coralliophila isosceles n. sp.

Fig. 39(*a*)

Protoconch 1½ (2) whorls, alt. 1, diam 1·25 mm., smooth, a faint peripheral keel on last part, junction with 1st postnatal whorl indistinct. Postnatal whorls 4–4½, profile of spire straight, periphery at bottom of whorls, below which the whorl contracted to the sunken suture. No axial ribs. Spiral lirae on 1st whorl 3, the 3rd peripheral and strongest, on 2nd whorl 5, the 4th peripheral and strongest; on 3rd 5 or 6, the 4th or 5th strongest; on 4th whorl 9, the 6th strongest; 8–9 additional lirae on base; all lirae squamose. Aperture

angularly piriform, contracted anteriorly, rostrum costate, canal open, columella with free edge anteriorly, a shallow umbilicus. 18 (with protoconch) × 12 mm.; 15 (with protoconch) × 10·5 mm. Pale greyish-brown.

Off Glendower Beacon (Port Alfred area), 66 fathoms, 2 dead but fresh (S. Afr. Mus. A4951. P.F. coll.).

Remarks. In general shape somewhat similar to *rosaceus*, but easily distinguished by the straight profile of the spire, the peripheral lira near bottom of whorl, and the absence of axial ribs or knobs.

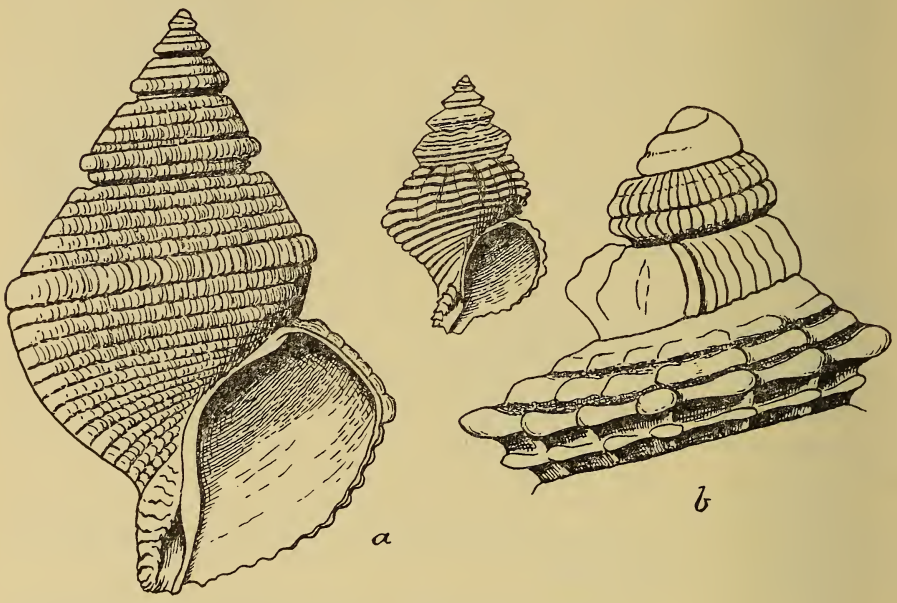

Fig. 39.

(*a*) *Coralliophila isoceles* n. sp. (*b*) *C. zuluensis* n. sp., whole shell to illustrate shape (squamae on lirae not indicated), and protoconch.

Coralliophila zuluensis n. sp.

Fig. 39(*b*)

Protoconch 3½ whorls, alt. 0·6, diam. 0·75 mm., 2nd and 3rd whorls each with *c*. 30 pliculae, cut by 2 spiral striae, the upper one feeble and indistinct, on last half whorl the lower stria and the pliculae below it are concealed by the encroaching suture of the 1st postnatal whorl, the protoconch is consequently lopsided, junction with 1st postnatal whorl marked by a slight varix. Postnatal whorls 6, profile of first 4 carinately angular, of last 2 convex; axial ribs on 1st whorl 10, on 2nd and 3rd 11, on 4th 9, on 5th and 6th 8, broadly rounded, petering out on upper part of base; crossed by spiral lirae 4 on 1st whorl, the 3rd lira most prominent, on 4th and 5th whorls 5, the 4th most prominent, on 5th and 6th 7, the 5th lira a little more prominent than the others, in places 2

additional lirae are visible one above and one below the peripheral lira; on upper whorls the strong peripheral lira forms projecting knobs at the intersections with the axial ribs, on later whorls it merely accentuates the roundness of the ribs; on base 6 additional lirae; all lirae strongly squamulose. Rostrum costate and squamose; canal short, distinctly delimited, partly overgrown by anterior end of columella. 21 × 13 mm.

Uniform cream, interior of canal mauve.

Off O'Neill Peak (Zululand), 90 fathoms, one dead but fresh (S. Afr. Mus. A8852. P.F. coll.).

Coralliobia madreporarum (Sow.)

1832. Sowerby. *Gen. Moll. Purpura*, fig. 2.
1859. Chenu. *Man. Conchyl.*, i, figs. 851, 852.
1880. Von Martens. *Mauritius & Seychellen*, p. 237 (references).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 173, pl. 7, fig. 11.

One living example, 15 × 9 mm., white with violaceous columella, rose-madder operculum Delagoa Bay (U.W.).

Distribution. Mauritius, Réunion, East Indies.

Fam. *MURICIDAE*

1929. Thiele. *Handbuch*, i, p. 287.

Murex brevispina Lam.

Figs. 40(*b*), 41(*a*)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 159.
1952. Braga. *Anais Est. zool. Ultramar.*, vii, 3, p. 76, pl. 3, fig. 5.

Protoconch 2½ whorls, alt. and diam. 1·3–1·5 mm., smooth, not sharply demarcated from 1st postnatal whorl.

Radula with *c.* 120 rows, central plate with median cusp longer than side cusps, lateral plate stout (cf. *ternispina*: 1911. Schepman, Siboga Exp. monogr., xlix, pl. 24, fig. 8).

Dead: Durban Bay (Krauss).

Living: Delagoa Bay (K.H.B. coll.; also Braga, and U.W.); Inhambane (U.C.T.).

Murex fallax Smith

Fig. 41(*b*)

1901. Smith. *J. Conch.*, x, p. 113, pl. 1, fig. 9.
1903 (July). Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227.
1903 (Oct.). Smith. *Proc. Mal. Soc.*, v, p. 375.

Protoconch large, 2½ whorls, alt. and diam. 2 mm., smooth. Postnatal whorls 6 (Smith), 1st whorl sharply demarcated from protoconch by a varix;

axial ribs obscure on 1st whorl, *c.* 14 on 2nd, 11 better developed on 3rd; varices not prominent, 3 on each of the later whorls, shoulder bluntly nodular, 3 (sometimes only 2) intervening ribs bluntly nodular at shoulder and at lower end; each varix with only one spine a little above middle of rostrum from 3rd whorl onwards (very feebly developed on 2nd whorl); spiral lirae more prominent on early whorls than the axial ribs, 4 on 1st whorl, on 2nd and 3rd 4 with intermediaries (total 6–7), obscure on later whorls, on base and rostrum of 3rd whorl (juv.) *c.* 24, on 5th whorl of large specimen few and feeble, outer surface of reflexed columella (which forms the inner lip) corrugate; inner columellar surface not lirate. 78 × 41 mm. (Smith); 59 (5 whorls, protoconch missing) × 30 mm.; protoconch plus 2 whorls 13 × 7 mm.; protoconch plus 3 whorls: 18 × 10 mm.

Fig. 40.

Central and lateral radula plates of (*a*) *Murex ramosus* Linn.; (*b*) *M. brevispina* Lam.; (*c*) *Tritonalia puncturata* (Sow.); (*d*) *Trophon acceptans* n. sp.; (*e*) *Drupa squamilirata* (Smith); (*f*) *Thais capensis* (Petit); (*g*) *T. dubia* (Krss.); (*h*) *T. wahlbergi* (Krss.); (*i*) *T. castanea* (Küster); (*j*) *Urosalpinx heptagonalis* (Rve.).

Operculum broadly oval, 14 × 10 mm. in 59 mm. shell, nucleus below centre, growth-lines prominent.

Buff with obscure brown spiral bands, chiefly on the shoulder knobs, and on rostrum, aperture white, operculum amber-brown.

Dead: off Durban, 40 fathoms, from fish stomach (Smith); off Umtwalumi River (Natal), 25 fathoms, 2 juv. (S. Afr. Mus. P.F. coll.).

Living: off Port Shepstone (Natal), 36 fathoms (Sowerby).

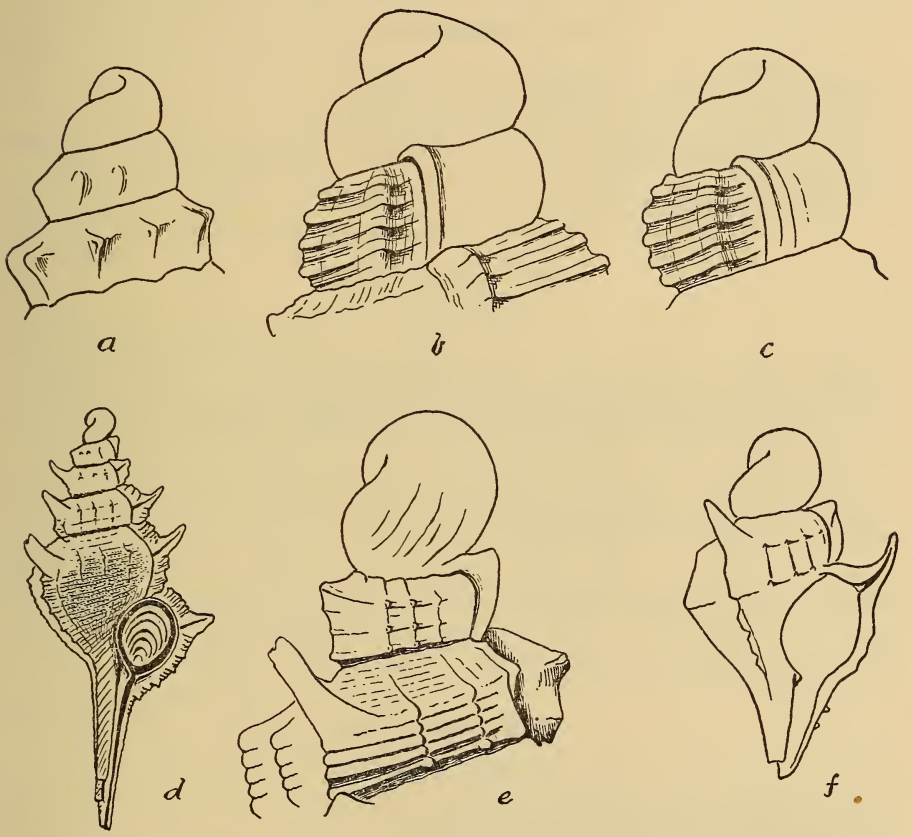

FIG. 41.

(*a*) *Murex brevispina* Lam. (*b*) *M. fallax* Smith. (*c*) *M. axicornis* Lam. (*d*), (*e*) *Murex* sp., whole shell, with protoconch and 1st postnatal whorl further enlarged. (*f*) *Murex* sp. juv.

Remarks. This species has a remarkably large protoconch for a species of this genus, distinctly larger than that of *brevispina*, *axicornis*, and *ramosus*. By this character, and by the sculpture of the apical whorls, juveniles are easily distinguished from *brevispina*.

Unfortunately the animal of the specimen recorded by Sowerby was not preserved.

There are some Ceylonese specimens in S. Afr. Mus. labelled *haustellum*, with pink apertures (? *chrysostoma*). None of them has a protoconch; but the 1st whorl is narrower than that of *fallax*, and presumably the protoconch was also narrower. Axial ribs 14 on 1st and 2nd whorls, 13–14 on 3rd; spiral lirae only 3 on 1st and 2nd whorls, 4 plus intermediaries on 3rd whorl.

Smith said *fallax* differed from *haustellum* in colour, but except the white aperture the large Natal example resembles the Ceylonese specimens.

Murex virgineus Bolten-Röding

1798. Bolten-Röding. *Mus. Bolt.*, p. 141.
1822. Lamarck. *Anim. sans Vert.*, vii, p. 171 (*anguliferus*).
1931. Lamy. *Bull. Mus. Paris* (2), iii, p. 304 (*angulifer* [*sic*]).
1952. Satyamurti. *Bull. Madras Govt. Mus.*, n.s. I, 2, pt. 6, p. 155, pl. 15, figs. 1*a*, 1*b* and var. *ponderosus* Sow.

Ponta Gea, Beira (Lamy).

Murex ramosus Linn.

Fig. 40(*a*)

1758. Linne. *Syst. Nat.*, ed. 10, p. 747, no. 448.
1822. Lamarck. *Anim. sans Vert.*, vii, 160 (*inflatus*, non Brocchi).
1880. Von Martens. *Mauritius & Seychellen*, p. 231 (*inflatus*).
1952. Braga. *Anais Est. zool. Ultramar.*, vii, 3, p. 76 (*inflatus*).

Protoconch 2 whorls, alt. and diam. 1 mm., smooth.

Radula with *c.* 225 rows, central plate with median cusp larger than side cusps, lateral plate rather slender.

Dead: Port St. Johns (very worn) (S. Afr. Mus.); off Itongazi River (between Port Shepstone and Port Edward, Natal), 25 fathoms, one juv. very worn (S. Afr. Mus. P.F. coll.). Delagoa Bay (Braga; and U.W.).

Living: Inhambane (U.C.T.).

Murex axicornis Lam.

Fig. 41(*c*)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 163.
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227.
1906. Smith. *Ann. Natal Mus.*, i, p. 38.
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 346, pl. 24, fig. 11 (radula).

Protoconch 2½ whorls, alt. and diam. 1·5 mm., smooth. Postnatal whorls 6, 1st sharply demarcated from protoconch by the spiral lirae but protoconch has also 2–4 fine axial plicae before the junction. Axial ribs 11 on 1st whorl, but indistinct, 10 on 2nd, 9 on 3rd and following whorls, every third rib becoming a varix, the intervening 2 (sometimes in later whorls only one) becoming peripheral knobs, not crossing base in later whorls; each varix with a strong but slender pinnate shoulder spine, followed by 5 (3 on outer lip, 2 on canal) smaller spines, all grooved and hollowed in front; spiral lirae 5 on 1st

whorl, on 2nd and following whorls intermediaries develop so that whole whorl is covered with numerous fine lirae; canal nearly closed. Length 70 mm. (S. Afr. Mus.); 78 mm. (protoconch missing) (U.C.T.).

Operculum broadly oval, nucleus apical, growth-lines prominent.

Buff, with or without brown blotches, or white.

Radula (number of rows ?) central plate with median cusp broader but not longer than side cusps, lateral plate slender (Schepman).

Living and dead: off Cape Natal, 47 and 54 fathoms: off Umhloti River, 40 fathoms; off Umvoti River, 56 fathoms (Sowerby, and S. Afr. Mus. P.F. coll.). 29° 30′ S. 31° 23′ E., 68 metres (s.s. *Africana II*).

Remarks. The depth '110' fathoms in Sowerby was a typ. err.; it was repeated by Smith.

Three specimens in S. Afr. Mus. from the Moluccas vary a little from the South African specimens: two have 2 spines on the canal, the third has 3, and all have only one large spine with 3–4 minor ones on the outer lip.

Murex adustus Lam.

1822. Lamarck. *Anim. sans Vert.*, vii, p. 161.
1859. Chenu. *Man. Conchyl.*, i, fig. 578.
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 346.
1938. Adam and Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 155.
1952. Satyamurti. *Bull. Madras Govt. Mus.*, n.s. I, 2, pt. 6, p. 156, pl. 15, figs. 2 *a*, *b* (not good).

Canal about 1½ times as long as aperture. Varices with pinnate and frondose spines. One prominent rounded knob between each pair of varices. Up to 70 mm.

Ochraceous or fulvous, more or less suffused with smoky-brown or black, especially the frondose varices.

Off Tugela River, 14 fathoms, one worn and discoloured, 37 × 22 mm. (S. Afr. Mus. P.F. coll.).

30° 47′ S. 30° 29′ E., 24 fathoms (U.C.T.).

Remarks. The U.C.T. specimen is covered with a very thin layer of Sponge.

A very similar Indo-Pacific species: *rubiginosus* Rve., which has two knobs or short axial ribs between each pair of varices and is not so 'sun-burnt' in coloration, occurs on the East African coast at Lamu (S. Afr. Mus. coll. E. L. Layard on board H.M.S. *Castor* 1856).

Murex sp.

Fig. 41(*d*), (*e*)

Canal twice as long as aperture, rostrum elongate. Protoconch large, lopsided, 2 whorls, alt. 2·5, diam. 2 mm., smooth, ending with a plain narrow varix. Postnatal whorls 4; axial ribs 12 on each whorl, every 4th rib forming

a sharp varix, with a simple slightly curved hollow spine at shoulder; spiral lirae 3 on 1st whorl, uppermost one forming the shoulder, following whorls with lirae above shoulder and intermediaries below, on last whorl respectively 8 and 10–12, the shoulder lira forming complanate nodules at intersections with the ribs between each pair of varices; about 8 additional lirae on base and rostrum, with intermediaries; edge of varices below shoulder spine serrate-crenulate. Growth-lines between the varices forming a cancellate-granulate sculpture. Aperture rimate. Canal nearly closed. 37 × 14 mm.

Operculum broadly oval, 6·5 × 4·75 mm., nucleus near apex, growth-lines prominent.

Radula with *c.* 130 rows, central plate with median cusp longer than side cusps, lateral plate slender.

Off Cape Natal, 85 fathoms, one living (S. Afr. Mus. A8833. P.F. coll.).

Murex sp. juv.

Fig. 41(*f*)

Protoconch 2 whorls, alt. 1·5, diam. 1·25 mm., smooth, ending in a plain narrow varix. First postnatal whorl with 3 varices, each with a simple, curved, hollow shoulder spine, and 3 nodules between each pair. Total length 5 mm.

Off Cape Natal, 85 fathoms, one juv. (S. Afr. Mus. A8834. P.F. coll.).

Although taken in the same haul as the previous species, this juvenile belongs to a different species because the protoconch is much smaller. Larger specimens might show some resemblance to the East Indies *falcatiformis* Thiele (1925. *D. Tiefsee Exp.*, xvii, p. 168, pl. 30 (18), fig. 10).

'Murex' *uncinarius* Lam.

Fig. 42(*a*)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 166.
1840. Sowerby. *Proc. Zool. Soc. Lond.*, p. 143, and *Conch. Illustr.*, no. 53, fig. 76 (*Murex capensis*).
1848. Krauss. *Südafrik. Moll.*, p. 112 (*capensis ? uncinarius*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 24 (*Murex* (*Pteronotus*) [*sic*] *u.*).
1925. Thiele. ibid., xvii, p. 168 (*Murex* (*Pterymurex*) *u.*).
1929. id. *Handbuch*, i, p. 299 (*Tritonalia* (*Poropteron*) *u.*).

Protoconch 1½–2 whorls, alt. and diam. 0·8–0·9 mm., smooth. Postnatal whorls 6, 1st sharply demarcated from protoconch; 1st whorl with 10 axial ribs, 2nd with 8, but towards end of 2nd the alternate ribs begin to become carinate varices with hollow, alate-uncinate expansions, 3rd and later whorls each with 3 varices alternating with 3 low rounded peripheral convexities (scarcely bosses), profile evenly convex to the convexity (no angular shoulder); on last 3 varices the uppermost (largest) alate expansion more or less uncinately curved upwards towards apex, exsert (not incurved); 2–4 (ocasionally 5) smaller acute processes below the large uppermost expansion; on preceding

whorl these processes (except one at suture) are concealed by the succeeding whorl; spiral lirae on 1st whorl 2 peripheral, obsolete on 2nd whorl, replaced on this and following whorls by numerous fine striae, particularly well marked on hinder side of the varical expansions; on 5th and 6th whorls the peristome appears to become continuous and the canal closed at the formation of each successive varix. 27 (6 whorls, protoconch missing) × 12 (excl. processes) 19 mm. (incl. processes); smallest specimen seen (protoconch plus 3 whorls) 17·5 × 2·5 mm. (excl. processes).

Operculum and animal unknown.

Pure white, porcellanous. Beach specimens tend to become buff, pinkish, or brown.

Port Elizabeth, Port Alfred, Still Bay, False Bay (auct. and S. Afr. Mus.). St. Francis Bay, 80–100 metres (von Martens); 35° 29′ S. 22° 26′ E., 155 metres (Thiele). Algoa Bay, 25 fathoms; off Cape Morgan, 87 fathoms, off Cape Natal, 54 fathoms (S. Afr. Mus. P.F. coll.).

34° 15′ S. 25° 5′ E., 6 fathoms (U.C.T.).

Remarks. The *Pieter Faure* took four specimens (including the largest 27 mm.) in Algoa Bay, two of them in fresh condition with protoconchs; two from off Cape Morgan are also fresh with protoconchs and well-marked spiral striae; the Natal specimen is complete but encrusted with Serpulids.

The locality Table Bay (S. Afr. Mus.) is not acceptable.

So far as I am aware the radulae of this species and the following *mitraeformis* are unknown. The correct genus therefore remains uncertain: Thiele in

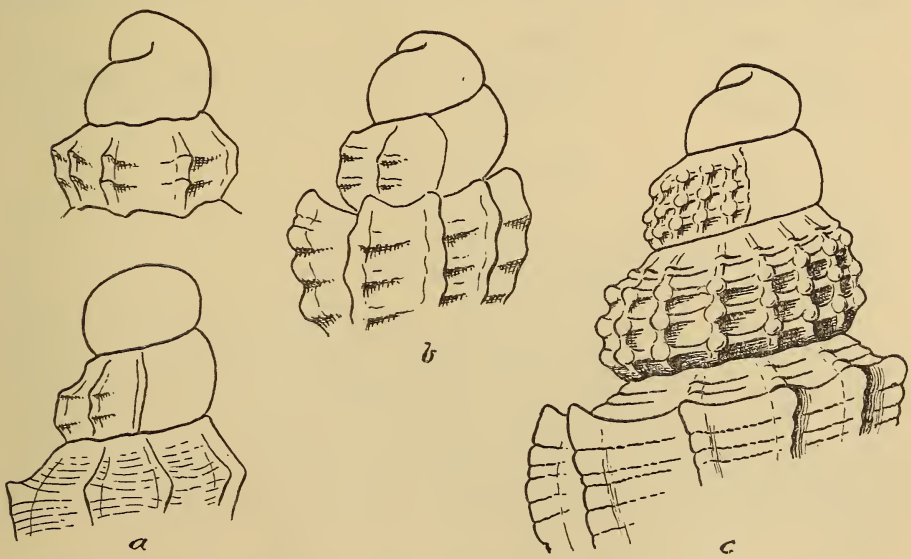

FIG. 42.

(*a*) 'Murex' *uncinarius* Lam., two views of protoconch. (*b*) 'M.' *mitraeformis* Sow. (*c*) 'M.' *wahlbergi* Krss.

1925 put *uncinarius* in *Murex* section *Pterymurex* (Rov. 1899, a synonym of *Pterynotus* Swainson 1840), but in 1929 in *Poropteron* Jouss. 1880, a section of *Tritonalia*.

'Murex' *mitraeformis* Sow.

Fig. 42(*b*)

1841. Sowerby. *Proc. Zool. Soc. Lond.* and *Conch. Illustr.*, fig. 75 (quoted from Krauss).*
1848. Krauss. *Südafrik. Moll.*, p. 112.
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 3 (quotes *Conch. Illustr.*, fig. 75).

In general similar to *uncinarius* but more turreted owing to the whorls being tabulately shouldered (with an obscure ridge) and sutures deeper.

Protoconch 1½ whorls, alt. and diam. 0·75 mm., smooth. Postnatal whorls 5, 1st sharply demarcated from protoconch; 1st whorl with 9 axial ribs, 2nd with 7, 3rd–5th each with 3 varices alternating with 3 bosses. The uppermost and largest expansion on each varix is more tabulate than alate, and strongly uncinately curved towards apex, the tips incurved and often touching the preceding whorl; below the large uppermost expansion on last 3 whorls are 6 smaller processes, blunt, hook-like and curved forwards, at least 2 of which (sometimes 3) are exposed; spiral lirae 2 on 1st whorl, 3 on 2nd, becoming 4 on 3rd, and thereafter replaced by numerous spiral striae. Canal closed. 22 (protoconch missing) × 9 mm.

Operculum and animal unknown.

Cape and Natal (Sowerby, Krauss); Still Bay, Port St. Johns, and Tongaat (Natal) (S. Afr. Mus.). The west coast of the Cape Peninsula (S. Afr. Mus.) is scarcely acceptable as a locality.

Remarks. One of six beach specimens from Still Bay retains the protoconch and spiral striae.

'Murex' *wahlbergi* Krss.

Fig. 42(*c*)

1848. Krauss. *Südafrik. Moll.*, p. 111, pl. 6, fig. 13.
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 3 (*Trophon w.*).

Protoconch 2 whorls, alt. and diam. 1·3 mm., smooth. Postnatal whorls 6, profile from 2nd or 3rd whorl onwards angularly shouldered, 1st whorl sharply demarcated from protoconch. Axial ribs on 1st whorl 14, on 2nd 13–12, on 3rd 10–9, on 4th, 5th and 6th 9–8, 6th whorl sometimes with only 7 ribs, from suture to suture, and extending across base to rostrum; from the shoulder downwards on 3rd and following whorls the ribs are lamellate, somewhat variable but when well developed sharply pointed at shoulder, and hollowed

* Krauss's reference to Sowerby seems to be incorrect, though Sowerby himself quoted fig. 75. Sherborn does not list 'mitraeformis Sow.' except as a *Scalaria* 1844, only *mitraeformis* Brocchi 1814 and *mitriformis* Wood 1828, nom. nud. Sowerby, *Proc. Zool. Soc.*, 1840, p. 143, gives 'fig. 75' for his *cancellatus*.

in front; spiral lirae on 1st and 2nd whorls 3, almost as strong as the ribs, with a feeble one between suture and shoulder on 2nd whorl, on 3rd 4 lirae with 2–3 feeble ones above shoulder, on 4th 4–5 or 6 lirae with 4–5 feeble ones above shoulder; lirae becoming broad and flat with narrow intervals, so that on later whorls the sculpture is more correctly described as striate. Sculpture thus cancellate on first 2 whorls (with transversely oblong hollows), axially ribbed on later whorls and lirate/striate in the intervals. Rostrum rimate. Canal when fully developed nearly closed. Outer lip plicate within. 41 × 22 mm.

Operculum and animal unknown.

Rubescent, aperture pale reddish or violaceous (Krauss). Natal (Krauss).

Remarks. Intermediary striae are developed on the body whorl, producing a somewhat similar sculpture to that of 'Purpura' *wahlbergi*, but the striae are never so numerous and close together, nor crispate, as in the latter species; young worn shells might, however, be difficult to identify.

Four adult shells in S. Afr. Mus. were presented by C. A. Fairbridge (who lived in Cape Town) in 1887, and were registered as coming from Table Bay. This locality is very doubtful as no specimens have since been recorded from any Cape locality.

There are also in S. Afr. Mus. 5 juveniles, 6·5–19 mm. long, without locality but probably collected in Natal (ex coll. Juritz).

Until the animal is discovered Sowerby's suggestion to transfer this species to *Trophon* is only provisional.

Trophon carduus (Brod.)

1832. Broderip. *Proc. Zool. Soc. Lond.*, p. 175 (*Murex c.*).
1903. Sowerby. *Mar. Invest. S. Afr.*, ii, p. 227 (*Trophon c.*).
1906. Smith. *Ann. Natal Mus.*, i, p. 38 (*Coralliophila c.*).

Protoconch 1½ whorls, alt. 0·5, diam. 0·75 mm. (but slightly worn), smooth. Postnatal whorls 6. Axial ribs 11 on all whorls, with angular shoulder, continued across base on body whorl; spiral lirae one on 1st whorl (at shoulder), 2 on 2nd (upper one forming the shoulder), 3 on 3rd and following whorls, intersection of shoulder lira with ribs on 1st and 2nd whorls forming little points, on 3rd and following whorls forming short blunt spines, grooved and hollowed in front, 3rd lira with shorter spines, 2nd lira with vaulted scales; on 5th and 6th whorls an intermediate lira between 2nd and 3rd lirae, with vaulted scales; 6 main lirae, with intermediaries, on base, all scabrous; on 5th whorl between suture and shoulder 4, and on 6th whorl 5 spiral series of vaulted scales marking the lines of growth. Columella reflexed, canal open, probably subequal in length to aperture (tip broken). 23·5 (canal tip broken) × 13 mm.

Operculum broadly oval, nucleus apical, 6 × 4 mm.

White, operculum amber-brown.

Living: off Port Shepstone (Natal), 250 fathoms (Sowerby).

Remarks. The above description is from the specimen recorded by Sowerby (now in S. Afr. Mus.); it does not correspond with Broderip's brief description, which said 'sexfariam varicosa-spinosa', and made no mention of the vaulted scales. On the Natal specimen the spinose varices are undecimfariam and the shoulder spines increase evenly in length around the whorls, and cannot be divided into groups of 6 (sexfariam).

Smith suggested the *species* (? whether he saw the Natal specimen) could be included in *Coralliophila*, but Sowerby's placing in *Trophon* seems better. The animal of the Natal specimen was not preserved.

Sowerby said the species was 'very rarely met with', but gave no other locality than Broderip's original one from Peru.

The Australian *T. carduelis* Watson is a very different shell.

Trophon acceptans n. sp.

Figs. 40(*d*), 43(*b*)

Protoconch 1½ whorls, alt. 1, diam. 0·75–0·9 mm., smooth. Postnatal whorls 6, profile of first 3 whorls evenly convex, of later whorls angularly shouldered slightly above the middle; axial ribs on 1st whorl 10, on 2nd 10–11, on 3rd 11–12, on 4th and 5th 12–13, on 6th 13–14, arching over the suture at top, extending across base to rostrum, broad basally but sharply keeled on body-whorl in juveniles and one adult, but abraded in the others, the intervals in cross-section V-shaped (not U-shaped), the back slope steeper than the forward slope; no spiral sculpture but a very slight indication of a shoulder keel between the ribs on body-whorl of adults, and two below even more obscure. Canal subequal to aperture, open. Protoconch plus 2 whorls 5 × 2·25 mm., protoconch plus 3 whorls 6·5 × 2·5 mm., adult 21 × 9·5 mm. (figured specimen 18 × 8 mm.).

Operculum oval, nucleus apical.

Pure white, juveniles pale buff, operculum amber.

Radula with *c.* 100 rows, central plate with median cusp a little longer than side cusps, a minute denticle between median and side cusp, lateral plate blade subequal in length to base.

Cape Point E. ¾ N., distant 36 miles, 630 fathoms, 5 adults; Cape Point N. 64° E. 37 miles, 700–800 fathoms, one adult; Cape Point E. × N., 35 miles, 500 fathoms, one adult living; Cape St. Blaize N. × E., 73 miles, 125 fathoms, 4 juv. (one living); 34° 26′ S. 25° 42′ E., 124 fathoms, 4 juv.; off Cove Rock (East London area), 80–100 fathoms, one juv., S. Afr. Mus. A3449, A3473 (Type), A3480, A8633, A8634, A8840. P.F. coll.).

Remarks. Of the five remaining adults (two were sent to Tomlin) all are more or less abraded; four are matt chalky white, the fifth (figured, A3473) very little abraded on the body-whorl which is almost glossy, especially within the aperture. The juveniles are clean and fresh.

One juvenile (off Cape St. Blaize) 8 mm., has 10 axial ribs on 1st–3rd whorls, but only 9 more widely spaced on the 4th whorl. Its radula corresponds with that of the type.

In describing *declinans* (1886. *Challenger Rep.*, xv, p. 168, pl. 10, fig. 10) from 69 fathoms off Marion Island, Watson was inclined to regard it as conspecific with the North Atlantic *truncatus* Strom. (see: Sars, 1878. *Moll. Arct. Norveg.*, p. 246, pl. 15, fig. 9) and separated it only in deference to the opinion of Sars and Gwyn-Jeffreys. There is a slight but distinct difference in the convexity of the profile from apex to aperture between the figures of the two species.

The present specimens (adults) have stronger shoulders than either *truncatus* or *declinans*, more like *clavatus* Sars (loc. cit., pl. 15, fig. 12), but the last species has the ribs acute at the shoulders; nor are the shoulders so high up as in *clathratus* Linn. (Sars, loc. cit., pl. 15, fig. 10). The axial ribs are fewer than in *truncatus* and *declinans*.

The *Pieter Faure* specimens thus seem worthy of acceptance as a species distinct from *declinans*. Possibly connecting forms may exist in the area between South Africa and Marion Island.

There is a strong resemblance to *tenuirostratus* Smith (1899. *Ann. Mag. Nat. Hist.* (7), iv, p. 241, and 1901. *Illustr. Zool. Investigator. Moll.*, pl. 10, figs. 4, 4a) from the Andaman Islands, 185 fathoms. The body-whorl has 3 scarcely visible spiral keels as in the Cape specimens, but there are one or two fewer axial ribs, and the upper whorls are shouldered slightly *below* the middle.

Trophon ? *incertus* n. sp.

Fig. 43(*a*)

Protoconch 2 whorls, corroded. Postnatal whorls 5, profile strongly shouldered about in middle of whorl, sutures undulate; axial ribs 12 on 1st whorl, 12–13 on 2nd, 13–14 on 3rd, 14–15 on 4th, 16–17 on 5th, from suture to suture, slightly curved above shoulder, extending across base; crossed by a spiral lira at shoulder, and one (Type) or 2 (cotype) below shoulder, about 12 additional lirae on base, with an intermediary between each pair; intersections slightly tubercular, strongest at shoulder. Columella nearly straight. 13–14 × 6 mm. Pale buff.

Off Cape Natal (Durban), 440 fathoms, two (S. Afr. Mus. A8843. P.F. coll.).

Remarks. Similar to *Trophon* ? *celebensis* Schepman (1913. *Siboga Exp. monogr.*, xlix, p. 452, pl. 30, fig. 13) except that the latter has 5 spiral lirae on body-whorl, and 20 axial ribs. The *Siboga* shell was obtained at 462 metres in the East Indies.

Schepman remarked that it might possibly prove to be a Pleurotomid. In the present two shells the ribs above the shoulder and the intervening growth-lines are slightly concave, but scarcely as strong as in most Pleurotomids (*Surcula*); there is no minute crinkling at the suture.

Trophon sp. juv.

Fig. 43(*c*)

Protoconch 1½ whorls, low, alt. 0·5, diam. 0·8 mm., smooth, a few very fine pliculae or growth-lines before the definite axial ribs begin. Postnatal whorls 3, shouldered, profile above and below shoulder straight; axial ribs 14 on 1st whorl, 17 on 2nd, 20 (21) on 3rd, at shoulder slightly nodular and connected by a lira, feeble on 2nd, indistinct on 3rd whorl, extending not quite to suture above and obsolete on base. Columella curved, canal rather long. 5·25 × 2·5 mm. Cream.

Off Cape Natal (Durban), 440 fathoms, one juv. (S. Afr. Mus. A8841. P.F. coll.).

Remarks. The shell is extremely fragile. Although there is no trace of a lip sinus, this shell might possibly be a *Surcula.*

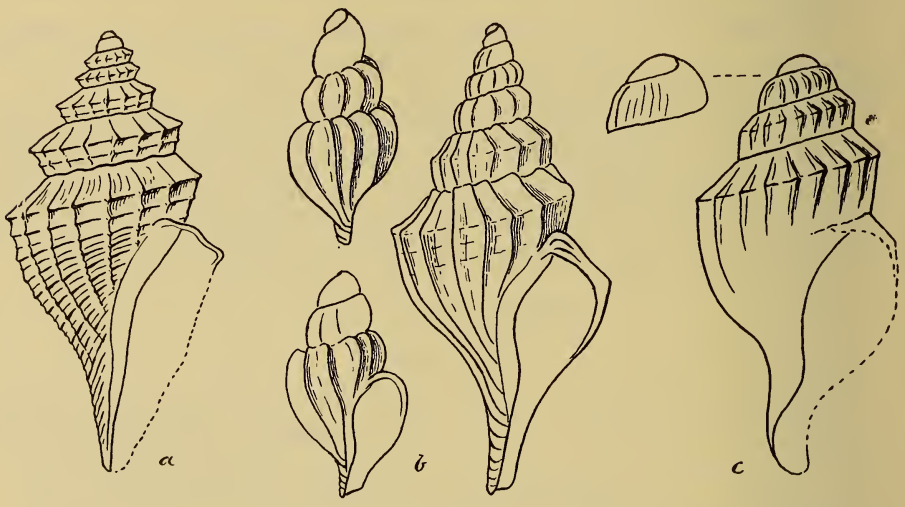

Fig. 43.

(*a*) *Trophon incertus* n. sp. (*b*) *T. acceptans* n. sp., with two views of juvenile. (*c*) *Trophon* sp. juv.

Trophon acutispira (Sow.)

Fig. 44(*c*), (*d*)

1921. Sowerby. *Proc. Mal. Soc.*, xiv, p. 125, text-fig. (*Cominella a.*).
1931. Tomlin. *Ann. Natal Mus.*, vi, p. 429 (*Cominella a.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 52 (*Cominella a.*).
1947. Tomlin. *J. Conch.*, xxii, p. 271 (*Afritrophon a.*).

Protoconch 2 whorls, smooth. Postnatal whorls 3. The 11–12 axial ribs are equally as strong as the two spiral lirae, with nodules at the intersections; 4–5 additional lirae on base. 5 mm. long.

Operculum oval, nucleus on outer margin below middle.

Radula with *c.* 115 rows, central plate with 3 subequal cusps, postero-lateral corners of base acute, lateral plate slender.

Port Alfred (Sowerby, Turton).

Living: Lambert's Bay (U.C.T.).

Remarks. The above description from a single specimen (U.C.T.). If it is correctly identified, *acutispira* with its smooth protoconch cannot be included in the genus *Afritrophon* (*v. infra*).

Sowerby described two specimens, 10 × 4 mm., with 2 smooth apical whorls followed by 4 bilirate whorls, base with 4 additional lirae, and axial ribs forming a 'crisply nodulous' cancellate sculpture. Above the shoulder the whorls are 'concavely depressed', a character which apparently induced Sowerby to place the species in *Cominella.*

Fig. 44.

(*a*) *Trophon mioplectos* n. sp. (*b*) *T. johannthielei* n. sp. (*c*) *T. acutispira* (Sow.). (*f*) *T. pistillum* n. sp. Central and lateral radula plates of (*d*) *T. acutispira* (Sow.); (*e*) *Afritrophon kowieensis* (Sow.).

Trophon jucundus Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 169, pl. 30 (18), fig. 13.
1947. Tomlin. *J. Conch.*, xxii, p. 271 (*Afritrophon j.*).

Protoconch 1½ whorls, alt. 0·75, diam. 0·5 mm., smooth. Postnatal whorls 3½, rather squarely shouldered immediately below the sutures; 1st whorl sharply demarcated from protoconch, with 11 axial plicae, 2nd whorl with 14, 3rd with 18 (counting from outer lip upwards the body-whorl has 21); plicae thin, with free edges, from suture to suture, extending across base to canal; on 2nd and 3rd whorls 3 spiral lirae, on last half-whorl 4 (by interpolation between 1st and 2nd series); lirae not so prominent as the axial plicae which form vaulted squamulae at the intersections; 2 additional lirae on upper part of base, but none on lower part, the plicae on base not or only feebly crinkled. Outer lip patulate. 5 × 2·3 mm. (Thiele); 5 × 2·5 mm. (S. Afr. Mus.). Pale buff.

35° 16′ S. 22° 26′ E., 155 metres, one (Thiele).

Off Cape St. Blaize (N. × E., 73 miles), 125 fathoms, one (S. Afr. Mus. A8619. P.F. coll.).

Remarks. The *Pieter Faure* specimen came from almost the same locality as the *Valdivia* specimen. The tip of the canal is broken, but otherwise the shell is unworn. The thin, strongly crispate and outstanding plicae overshadow the

spiral lirae, and thus the sculpture appears a little less distinctively cancellate than in Thiele's figure.

The smooth protoconch precludes the inclusion of this species in *Afritrophon*.

Trophon mioplectos n. sp.

Fig. 44(*a*)

Protoconch 1½ whorls, alt. 0·75, diam. 0·5 mm., smooth, junction with 1st postnatal whorl clearly marked. Postnatal whorls 3; axial plicae on 1st whorl 13, on 2nd 14, on 3rd 15, lamellate, sharp, from suture to suture and extending across base to rostrum; profile of 2nd whorl obscurely biangulate, of 3rd more distinctly biangulate. Tip of canal broken. No spiral sculpture. 4 × 2 mm. Dirty white.

34° 27′ S. 25° 42′ E., 256 fathoms, one (S. Afr. Mus. A8631. P.F. coll.).

Remarks. Differs from *denseplicatus* Turton 1932 and *gemmulatus* Turton 1932 (the latter appears to be synonymous with the former) in having fewer axial plicae, presuming Turton's count was correct. He gave 'nearly 30' for *denseplicatus* and 'nearly 20' for *gemmulatus*. Both photographs are rather poor, but even that of *denseplicatus* seems to indicate at most 20 plicae.

Trophon johannthielei n. sp.

Fig. 44(*b*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 170, pl. 30 (18), fig. 16 (*Trophon* sp. juv.).

Protoconch 1½ whorls, alt. 0·5, diam. 0·75 mm., smooth. Postnatal whorls 3, profile biangulate, junction with protoconch abrupt. Axial plicae 11 on each whorl, strongly retractive from suture to shoulder and then vertical, thin, with free edges, and squamosely raised at intersections with 2 feeble spiral lirae. Plicae extend from suture to suture, and across base, with squamulae on 2 additional lirae. Growth-lines obscure. Tip of rostrum broken. 5 × 2·8 mm. Pale buff.

35° 19′ S. 20° 12′ E., 126 metres, one (Thiele).

Off East London, 400–450 fathoms, one, exceedingly fragile (S. Afr. Mus. A8844. P.F. coll.).

Remarks. Thiele's example with protoconch plus 2 whorls measured 3·6 (according to the magnification of his figure). The thin free-edged plicae are similar in this species and *jucundus* Th., but are more numerous and less strongly squamate in the latter. Also the shape of the protoconch is different.

Trophon pistillum n. sp.

Fig. 44(*f*)

Protoconch 1½ whorls, alt. 0·8, diam. 0·75 mm., smooth. Postnatal whorls 3, profile angular. Axial plicae 11–12 on 1st whorl, 13–14 on 2nd,

15–16 on 3rd, retractive (but less so than in *johannthielei*) from suture to shoulder, then vertical, thin, with free edges, squamately raised at intersections with 2 feeble spiral lirae; plicae extending from suture to suture, and across base with tubercles on 2 additional lirae. The squamae on the plicae are not hollow in front, but filled in with a tiny plug or tubercle, rather like the piston in a cylinder (with incomplete rim). 3 or 4 growth-lines distinct between each pair of plicae. Rostrum broken. Approximately 5 × 3 mm.

Operculum oval, nucleus apical.

Radula with *c.* 70 rows, central plate with 3 cusps, the median one larger than the side cusps, postero-lateral corner of base acute.

Off Cape Natal (Durban), 440 fathoms, one, exceedingly fragile (S. Afr. Mus. A8842. P.F. coll.).

Gen. Afritrophon Tomlin

1947. Tomlin. *J. Conch.*, xxii, p. 271.

Protoconch bicingulate. Postnatal whorls with one or more strong spiral lirae; axial ribs present on 1st postnatal whorl; on following whorls either well developed or obsolete. Sutures deep. Canal short. Operculum ovoid, nucleus on outer margin near apex.

Radula, central plate with 3 rather large cusps, postero-lateral corners of base acute, lateral plate slender.

Genotype: *Trophon kowieensis* Sow. 1901.

Remarks. Tomlin saw no specimen with an unworn protoconch, and did not mention it in his generic diagnosis. Fortunately for his genus, however, he happened to choose as genotype one of the species which has a peculiar protoconch.

Of the other four species included by Tomlin in his genus, *insignis* Sow. and *agulhasensis* Th. have similar protoconchs, and are rightly included. But *jucundus* Th. and *acutispira* Sow. (if my identification of the latter is correct) have a perfectly smooth protoconch and must be excluded. I refer them back to *Trophon*.

Tomlin declined to comment on Turton's (1932) four 'species'. One might, however, suggest that the figures of *denseplicatus* and *gemmulatus* indicate merely different aspects of the same species; *subglobosus* seems to be a *Turritella*; and *ornatus* is definitely the protoconch of a Turritid (cf. 'Clathurella' *capensis*).

An example of Thiele's 'Trophon sp. juv.' has been found in the *Pieter Faure* material; as it has a smooth protoconch it also is retained in *Trophon* (see *johannthielei*, p. 206).

Afritrophon kowieensis (Sow.)

Figs. 44(*e*), 45(*a*)

1901. Sowerby. *Proc. Mal. Soc.*, iv, p. 213, pl. 22, fig. 16 (*Trophon k.*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 169 (*Trophon ? kowiensis* typ. err.).
1947. Tomlin. loc. cit., p. 271.

Protoconch 1½ whorls, bicingulate. Postnatal whorls 4 (4½); axial ribs on 1st whorl 14–15, at first interrupted by the 2 spiral lirae, but later forming nodules at the intersections, on 2nd whorl 18–20, on 3rd 26–28, on 4th *c.* 28–34, from suture to suture, obsolete on base; on the 2nd whorl the nodules gradually become vaulted squamae, hollow in front; on the last whorl they are closely aggregated but vary in number; on 3rd and last whorls the axial ribs between suture and upper peripheral lira also become vaulted squamae. On base 4–5 additional squamose lirae. 8 × 3·3 mm.

Operculum ovoid, nucleus on outer margin near apex.

Radula with *c.* 130 rows, as in generic diagnosis.

Kowie (= Port Alfred) (Sowerby, Bartsch, Turton).

Agulhas Bank 80 metres, St. Francis Bay, 80 metres, and Algoa Bay, 102 metres (Thiele).

Off Great Fish Point, 22 fathoms; Algoa Bay; off Cape Recife, 52 and 124 fathoms; off Knysna Heads, 46 fathoms; off Cape St. Blaize, 125 fathoms; 34° 27′ S. 25 ° 42′ E., 256 fathoms (S. Afr. Mus. P.F. coll.).

Living: Algoa Bay, 60 fathoms; False Bay, 30 metres (U.C.T.).

Remarks. The original spelling was, quite correctly, *kowie - ensis*, and should be retained.

At first sight somewhat resembling a very slender *T. scrobiculata* (p. 212).

Recorded also by Thiele from Great Fish Bay, Angola, but the identity of this specimen, should, with due respect to Thiele, be accepted with reserve.

Afritrophon agulhasensis (Thiele)

Fig. 45(*c*)

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 169, pl. 30 (18), fig. 12 (*Trophon* ? *a.*).
1947. Tomlin. loc. cit., p. 271.

Protoconch 1½ whorls, bicingulate. Postnatal whorls 5 (Thiele gave *total* number of whorls in his specimen 6); axial ribs on 1st whorl 15, at first interrupted by the 2 spiral lirae, later forming nodules at the intersections; on 2nd whorl 14–13, later whorls 13–12, nodules at intersections becoming stronger and more outstanding, especially on the upper peripheral lira on 3rd–5th whorls, some of them auriculate, hollowed in front; ribs extending from suture to suture, obsolete on base; on base 4 less strongly nodose-squamose lirae and an indistinct 5th on rostrum. 8 × 3·5 mm.

Operculum ovoid, nucleus on outer margin near apex.

Radula with *c.* 145 rows, as in generic diagnosis.

35° 16′ S. 22° 26′ E., 155 metres (Thiele).

Off Cape St. Blaize, 125 fathoms; 35° 5′ S. 25° 55′ E., 67 fathoms; 34° 27′ S. 25° 42′ E., 256 fathoms (S. Afr. Mus. P.F. coll.).

Beach specimens: False Bay and Still Bay (S. Afr. Mus.).

Living: False Bay (U.C.T.).

Remarks. Although similar to *kowieensis*, this species, as Thiele said, is quite distinct: the area between suture and upper peripheral lira is quite smooth except for the fine non-squamose axial plicae, and the axial plicae are fewer; the nodules in unworn specimens are more outstanding and strongly auriculate.

In Thiele's specimen the 3rd (as here reckoned, = Thiele's 5th) lira on the base was not developed.

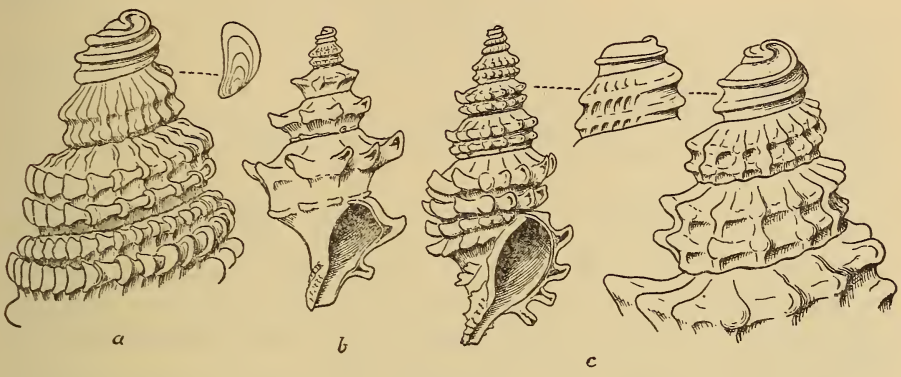

FIG. 45.
(*a*) *Afritrophon kowieensis* (Sow.), apex and operculum. (*b*) *A. insignis* (Sow.). (*c*) *A. agulhasensis* (Thiele), with apex and protoconch further enlarged.

Afritrophon insignis (Sow.)

Fig. 45(*b*)

1900. Sowerby. *Proc. Mal. Soc.*, iv, p. 2, pl. 1, fig. 1 (*Trophon ? i.*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 170, pl. 30 (18), fig. 14 (*Trophon i.*).
1947. Tomlin. loc. cit., p. 271.

Protoconch 1½ whorls, bicingulate. Postnatal whorls 4; 1st whorl with axial ribs and 2 spiral lirae as in the two previous species; from end of 1st whorl the lower lira is for the most part occluded by the suture of the following whorl, though here and there a tiny auriculate tubercle projects; the upper lira becomes very prominent with 8 or 9 sharp, auriculate, upturned tubercles; on base the 2nd lira becomes visible again, with auriculate tubercles less prominent than those on the upper lira; no other lirae on base; fine growth-lines distinct. 6·5 × 3 mm.

Kowie (= Port Alfred) (Sowerby, Bartsch, Turton, S. Afr. Mus.).

Off Cove Rock (East London area), 22 fathoms, 3 dead but fresh (S. Afr. Mus. A8849. P. F. coll.).

Remarks. In worn specimens the projecting tubercles become merely undulations on the peripheral keel; these undulations were not mentioned in the original description, but can be seen in the cotypes in S. Afr. Mus.

Thiele recorded a 3·7 mm. juvenile from Great Fish Bay, Angola; but I feel that the identification needs confirmation.

Gen. Typhis Montfort

1929. Thiele. *Handbuch*, i, p. 293, fig. 318 (radula).

Radula with wide central plate, 1–3 small cusps between the median and side cusps, lateral plate unicuspid, uncinate.

Typhis arcuatus Hinds

Fig. 46(*a*)–(*g*)

1843. Hinds. *Proc. Zool. Soc., Lond.*, p. 19.
1844. id. *Moll. Voy. Sulphur*, p. 10, pl. 4, figs. 1, 2.
? 1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 94, pl. 3, fig. 2 (*transcurrens*).
1925. Thiele. ibid., xvii, p. 170.

Protoconch 1½ whorls, alt. 1·3, diam. 1 mm., smooth, glistening. Postnatal whorls 5; 4 tubes and 4 varices on each whorl; tubes subcircular on early whorls, becoming oval and carinate in front on later whorls, sometimes on last whorl narrowly oval (complanate); varices curving forwards, carinate, connected with the tubes, but with a shallow notch at base of tube defined by a feeble angulation. 20 × 10–11 mm. (excl. tubes).

Operculum broadly oval, fitting the continuous peristome, nucleus apical, growth-lines well marked.

Surface dull or chalky-white, except the glistening protoconch.

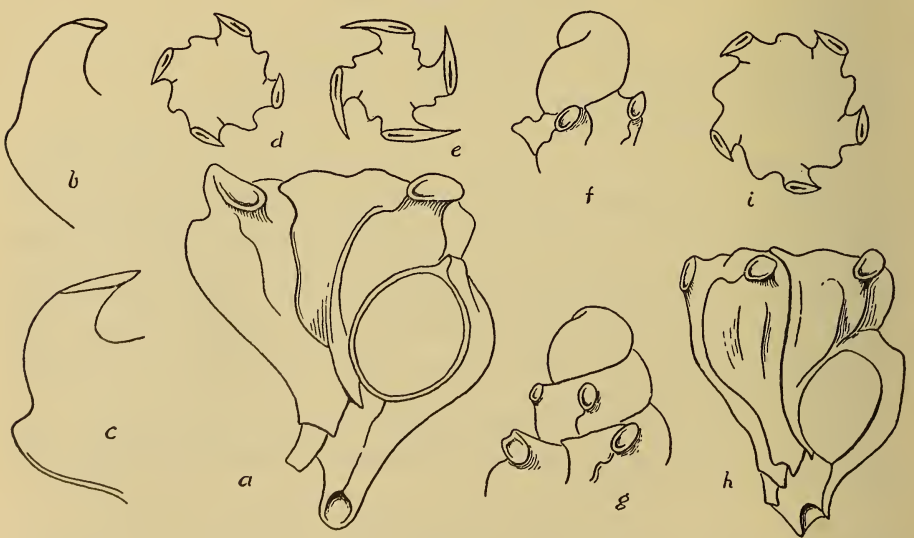

Fig. 46.

Typhis arcuatus Hinds. (*a*) body whorl. (*b*) anterior view of tube and varix. (*c*) the same of a specimen from Cape Point (S. Afr. Mus. no. A4945). (*d*), (*e*) diagrammatic apical views of normal specimen, and Cape Point specimen. (*f*), (*g*) two views of protoconch. *T. pentaphasios* n. sp. (*h*), (*i*) body whorl, and diagrammatic apical view.

Agulhas Bank, 40–45 fathoms (Hinds); 35° 16′ S. 22° 26′ E., 155 metres, and 35° 19′ S. 20° 12′ E., 126 metres (Thiele).

Off Cape Point, 123 fathoms; off Cape St. Blaize, 125 fathoms; off Cape Recife, 124 fathoms, juveniles; off East London, 43 fathoms (S. Afr. Mus. P.F. coll.).

Living: off Cape Point, 380–475 fathoms, one; off Cape St. Blaize, 55 fathoms, one (S. Afr. Mus. P.F. coll.).

Remarks. One specimen from off East London, although 5-whorled, is smaller than the others (15 × 6 mm.), and appears proportionately narrower because the tubes are curved upwards towards the apex; in typical specimens they project obliquely upwards. In two examples from off Cape Point, 123 fathoms, the tubes on the last whorl are very broad (transversely), complanate, and splayed outwards almost horizontally (fig. 46(*c*), (*e*)). The rather striking appearance thus produced might seem to indicate a different species, but the tubes become horizontally expanded only on the last whorl.

Five specimens have the varices carinate, with an obscure shoulder at the top defining the shallow notch at base of tube. In the narrow East London specimen the shoulder and notch are evanescent, and the last 3 varices become progressively less carinate, in fact the last is broadly rounded. In another East London example all the varices are broadly rounded, but those on the early whorls have a faint carination on the hinder side.

The length of the tubes is no criterion as they are subject to wear and corrosion.

Two juveniles with protoconch plus 1½ whorls, 3·5 mm. long, and two with protoconch plus 3 whorls, 7 mm. long., have been examined.

The animals of the two living *Pieter Faure* specimens were not preserved.

Apparently there is no character by which *transcurrens*, Zanzibar Channel, 5° 27′ S. 39° 18′ E., 463–465 metres, can be separated except size: 6 whorls (i.e. protoconch plus 5) 13 × 6 mm. (excl. tubes). Thiele, however, recorded both species.

Sowerby compared *duplicatus* (1870. *Proc. Zool. Soc. Lond.*, p. 251, China) with *arcuatus*, both species having curved varices.

Typhis pentaphasios n. sp.

Fig. 46(*h*), (*i*)

Protoconch corroded. Postnatal whorls 4; 5 tubes and 5 varices on each whorl; tubes oval-subcircular, with a broadly rounded rib below extending to the suture; varices broadly rounded, midway between tubes and growth-lines, profile evenly curved, not shouldered; peristome not quite continuous where the varix from the tube impinges upon it. 11 (incl. corroded protoconch) × 5·5 mm. White.

Off Cape Point, 660 fathoms, two dead (S. Afr. Mus. A4949. P.F. coll.).

Tritonalia puncturata (Sow.)

Figs. 40(*c*), 47(*a*)

1886. Sowerby. *J. Conch.*, v, p. 2 (*Cominella p.*).
1892. id. *Mar. Sh. S. Afr.*, p. 11, pl. 1, fig. 9 (*Cominella ? p.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 53, pl. 12, no. 393 (*Cominella p.*), and p. 53, pl. 12, no. 394 (*bipartita* color. var.).

Protoconch 2 whorls, alt. and diam. 0·5 mm., smooth. Postnatal whorls 6. Axial ribs on 1st whorl 15, on 2nd and 3rd 15–16, on 4th 17–18, but becoming fused one with another and obsolete on later whorls. Spiral lirae on 1st whorl 3, on 2nd 4, on 3rd 5, on 4th and 5th 6–7, the lower 2 stronger than those above and forming the peripheral shoulder, also usually a finer lira below the periphery, on 6th whorl 5 (6) fine, 2 stronger peripheral, and 2 subperipheral lirae. The sculpture on 1st and early part of 2nd whorl is cancellate, but thereafter the spirals predominate, especially the two peripheral ones; the groove between these two foveolate. On base 10–11 additional lirae, with punctate intervals. Canal open. 20 (without protoconch) × 9 mm.

Operculum oval, nucleus near outer margin below middle.

Buff or brownish, with darker axial streaks, or darker above and below the peripheral lirae, or dark above and pale below, or vice versa, lirae on body-whorl often spotted.

Radula with *c.* 180 rows, central plate with median cusp arising near front margin, 2 large submedian cusps on hind margin with 2–3 denticles between each of these and the median cusp.

False Bay, Hermanus, Still Bay, Mossel Bay, Port St. Johns (S. Afr. Mus.).

Living: west coast of Cape Peninsula (S. Afr. Mus.); Jeffreys Bay (St. Francis Bay), Knysna estuary, Mossel Bay, Breede River mouth (U.C.T.).

Remarks. The bicarinate and foveolate periphery is characteristic, as also are the finer lirae above the strong peripheral lirae. Some variation may occur: occasionally one of these finer lirae may be stronger than the others, almost as strong as the peripheral lirae.

Juveniles (5 mm.), especially slender forms, before there is a clear distinction between the fine upper lirae and the strong peripheral ones, are liable to confusion with *Trophon acutispira*. The axial ribs and the additional lirae on base are a little more numerous in *puncturata*.

Tritonalia scrobiculata (Dnkr.)

Fig. 47(*b*), (*c*)

1846. Dunker in Philippi. *Abbild. Beschr. Conch.*, ii, p. 118, pl. 3, fig. 4 (*Fusus s.*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 2 (*Murex ? Ocinebra s.*).
1892. id. ibid., p. 2, pl. 1, fig. 1 (*Murex babingtoni*).
1892. id. ibid., p. 2, pl. 1, fig. 2 (*Murex crawfordi*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 75 (*crawfordi*) and p. 76 (*scrobiculata* and *babingtoni*).

Protoconch 1½ (2) whorls, alt. 0·75, diam 0·5 mm., smooth. Postnatal whorls 4 (4½). Axial ribs on 1st whorl 11–12, on 2nd 12–14, on 3rd 15–16, on

last whorl *c.* 16–18 (but may occasionally be only 12); between suture and upper peripheral lira growth-lines form more or less distinct pliculae corresponding with the squamous nodules on the lira, usually sinuous, and more or less raised into vaulted squamulae; when strongly developed this series of squamulae forms the first of the 3 spiral lirae characteristic of *crawfordi* (fig. 47(*c*)); sometimes there are 2 such lirae, or, on the 4th whorl 3, so that the profile of 3rd whorl shows 4, that of 4th whorl 5 spiral lirae (*babingtoni*). The squamous nodules on the 2 strong peripheral lirae are very variable in strength. The foveoles between the lirae are usually nearly square, but may be transversely oblong when the number of ribs is reduced. On base 6 additional lirae, the 4th usually the smallest.

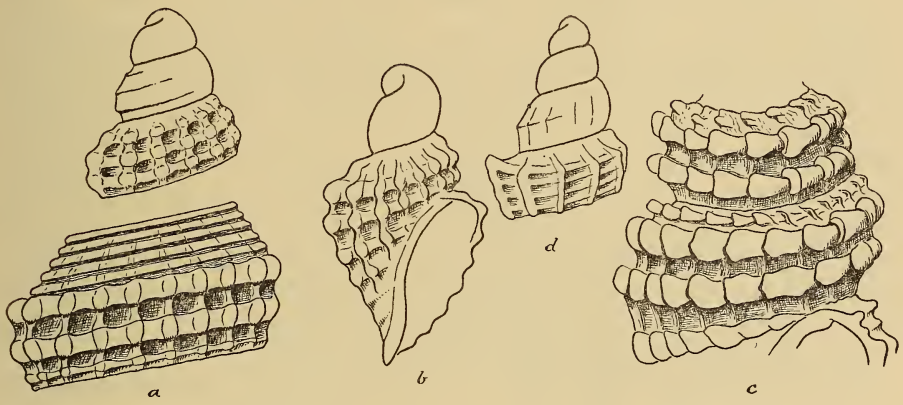

Fig. 47.

(*a*) *Tritonalia puncturata* (Sow.), 5th whorl, and protoconch. (*b*) *T. scrobiculata* (Dnkr.), protoconch. (*c*) 3rd and 4th whorls showing transition to 3-lirate *crawfordi*. (*d*) *T. kieneri* (Rve.).

Sometimes the spiral lirae are scarcely thickened and only feebly nodulous, consequently the axial ribs in the sulci are more distinct, and the sculpture more obviously cancellate. Worn examples of *babingtoni* appear distinctly cancellate.

The outer lip may be thickened, with 4–6 denticles within at the margin, but only when fully adult. Canal open. 15 × 7·5 (8·5) mm.; Turton: 22 mm. ? typ. err.

Operculum oval, nucleus near outer margin below middle.

Buff or brownish.

Radula with *c.* 150 rows, similar to that of *puncturata*.

Table Bay and west coast of Cape Peninsula, False Bay to Port Alfred, and Tongaat (Natal) (S. Afr. Mus.).

Off Knysna, 46 fathoms; off Keiskamma River, 33 fathoms; off East London, 32 fathoms (S. Afr. Mus. P.F. coll.).

Living: Langebaan (Saldanha Bay), and False Bay (U.C.T.).

Remarks. A common and distinct but variable species, which, it is not surprising, has been described from beach-worn specimens under three separate names.

Tritonalia purpuroides (Dnkr. MS.) (Rve.)

Dunker. MS. (as var. of *scrobiculatus*).

1845. Reeve. *Conch. Icon.*, Murex no. 158, pl. 32.
1848. Krauss. *Südafrik. Moll.*, p. 112, pl. 6, fig. 14 (*Murex dunkeri*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 25 (*Murex p.*).
1925. Thiele. ibid., xvii, p. 168 (*Murex p.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 76.

Protoconch $1\frac{1}{2}$ whorls, alt. and diam. 0·5 mm., smooth. Postnatal whorls 4–5. Axial ribs on 1st whorl 11, on 2nd 11–12, on 3rd (13) 12–11, on 4th 10–9 (8), on 5th 9–8. Spiral lirae 2 strong ones forming the peripheral shoulder; on base 6–7 additional lirae, often between the lower peripheral and the 1st basal lirae a thin lira, and often a similar one between 1st and 2nd basal lirae. Space between suture and upper peripheral lira smooth except for the fine growth-lines and axial plicae, the latter never squamulose; sometimes indications of 2 (very occasionally 3) fine spiral lirae between, but not crossing, the axial plicae. Intersections of axial ribs and peripheral lirae nodulous, or raised into pseudo-squamae (not or scarcely vaulted or hollowed in front). Basal lirae broader than the intervals, often very broad so that the intervals are mere striae. Outer lip in adult thickened, with 6–7 denticles or plicae within. Canal open. 15 × 7 mm.

Beach examples: white, often a faint brown band around middle of whorl, best seen within the aperture.

Cape, Port Elizabeth (Krauss, Bartsch, Sowerby); Port Alfred (Turton: only one specimen). Agulhas Bank, 35° 29′ S. 21° 2′ E., 102 metres, and 34° 51′ S. 19° 37′ E., 80 metres (von Martens).

Dassen Island, west coast of Cape Peninsula, and Kalk Bay (False Bay) (S. Afr. Mus.).

Remarks. Has not been taken alive. Apparently does not occur farther east than Port Elizabeth, though Turton claimed to have found one specimen at Port Alfred.

With fewer axial ribs than *scrobiculata*, especially on the last whorl. Most specimens, especially the extreme forms of the two species, are easily separable; but occasionally a specimen occurs which appears transitional and difficult to assign to one or the other. The absence, however, of squamulae between the suture and the shoulder lira seems to be a constant feature of *purpuroides*.

Tritonalia kieneri (Rve.)

Fig. 47(*d*)

1845. Reeve. *Conch. Icon.*, iii, Murex sp. 172 (*Murex k.*).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 60 (*Tritonalia k.*).

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 168, pl. 30 (18), fig. 9 (*Murex k.*).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 76.

Protoconch 2 ($2\frac{1}{2}$) whorls, alt. 1, diam. 0·8 mm., smooth. Postnatal whorls 4; axial ribs on 1st whorl 10–11, on 2nd 11, on 3rd and 4th 10–11 (3rd whorl in two slender specimens with only 9 ribs), from suture to suture and extending across base, including the groove, to rostrum; spiral lirae one peripheral on first half, 3 on later half of 1st whorl, 3–4 on 2nd whorl, 4 on 3rd and 4th whorls, on base 3 additional lirae followed by a deep groove, then 2 nodose lirae on rostrum; this groove forming a notch in outer lip is already developed on the 2nd whorl in the smallest specimen examined 4·5 mm. long. Canal narrow but not closed. 18 mm. (Turton). 12–13 mm. with worn apices (S. Afr. Mus.). Plump and slender examples (with 3 whorls): 8 × 4, 9 × 4, 9 × 4·5 mm.

Natal and Algoa Bay (Sowerby); Port Alfred (Bartsch, Turton); St. Francis Bay, 80 metres (Thiele); Still Bay and False Bay (S. Afr. Mus.).

Tritonalia sperata (Cossm.)

Fig. 48

1904. Smith. *J. Malac.*, xi, p. 30, pl. 2, fig. 11 (*Fusus cingulatus*, non Sowerby 1832).
1921. Cossmann. *Rev. Crit. Paléozool.*, xxv, p. 181 (*Fusus s.*).
1931. Tomlin. *Ann. Natal. Mus.*, vi, p. 434 (*Fusinus s.*).
1933. Turton. *Mar. Sh. Pt. Alfred*, p. 50 (*Fusus speratus* Crossman [*sic*] typ. err.).
1957. Barnard. *J. Conch.*, xxiv, p. 180, fig. (radula) (*Latiaxis fritschi*, non von Martens).
1959. id. ibid., xxiv. p. 327.

Protoconch 2 whorls, alt. 1–1·25, diam. 1·3–1·5 mm., smooth, junction with 1st postnatal whorl marked by several fine pliculae. Postnatal whorls 5, profile convex, in later whorls bluntly shouldered; axial ribs on 1st whorl 15–14, on 2nd 14–13, on 3rd 13–12, on 4th 11–10, on 5th 9–8, from suture to suture until 3rd whorl, thereafter petering out above and below the periphery where they form blunt rounded knobs, especially prominent on the body-whorl; crossed by spiral lirae 3 on 1st whorl (uppermost feeble at start), increasing to 4–6 on 2nd whorl, and very numerous on later whorls, *c.* 18–20 on 5th whorl; on 3rd whorl peripheral lira usually thicker than the others and rather prominent; on base *c.* 25 additional lirae (some being very fine intermediaries), on upper part of base one lira (usually the 5th) stronger than the others, forming a costa, rostrum costate; all the lirae minutely squamulose. Columella curved, its edge free and anteriorly produced over, but not completely closing the canal. 24 (apex missing, only 3rd–5th whorls present) × 15 mm. Smith: 28 × 14 mm.

Operculum oval, nucleus on outer margin below middle.

Grey with a rosaceous or violaceous tinge (U.C.T. specimen); fawn or buff (P.F. specimens, several years in alcohol). Beach specimens pinky-orange or salmon, the protoconch more deeply coloured.

Radula with at least 340 rows, central plate with median cusp arising from front margin, not extending as far as side cusps, which have one denticle on inner margin and 2–3 externally, postero-lateral corner of base acute, lateral plate moderately stout.

Dead: Port Alfred (Smith, Bartsch, Turton, S. Afr. Mus.).

Living: off Cape Morgan, 36 fathoms; off East London, 34–47 fathoms; Mossel Bay, 16 fathoms (S. Afr. Mus. P.F. coll.). Mossel Bay (U.C.T.).

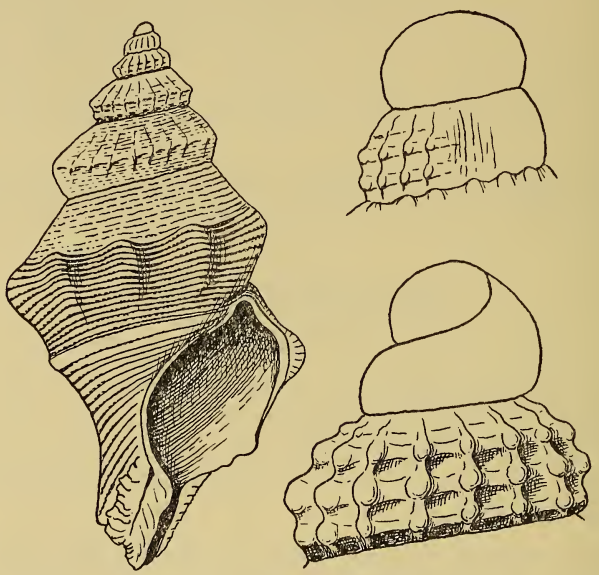

Fig. 48.
Tritonalia sperata (Cossm.).

Remarks. The costa on base (Smith: infraperipheral) is scarcely visible on 3rd whorl, feeble on 4th, and only becomes well developed on the 5th, and even then is variable in strength.

Gen. Thais Bolten

1919. Cooke. *Proc. Mal. Soc.*, xiii, p. 91, figs. (radulae).

Thais cingulata (Linn.)

Fig. 49(*f*)

1771. Linne. *Mantissa*, ii, p. 549 (*Buccinum c.*).
1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 422, figs. 4*a*, *b*. and Liste, p. 5 (*Triton trochlea*).
1822. id. *Anim. sans Vert.*, vii, p. 248 (*trochlea* and *clavus*).
1848. Krauss. *Südafrik. Moll.*, p. 118.
1859. Chenu. *Man. Conchyl.*, i, fig. 805.
1919. Cooke. loc. cit., p. 94, fig. 12 (radula).

Protoconch 1½ whorls, alt. 1, diam. 1–1·25 mm., smooth. Postnatal whorls 5, 1st demarcated from protoconch; axial ribs on 1st whorl 19–20, closer together at start than on later part of whorl, on 2nd and 3rd whorls 18–20, thereafter becoming irregular and intermixed with the finer growth-lines; spiral keels 2 on first part of 1st whorl, becoming 3 on later part, 3 on 2nd whorl, the upper one forming a shoulder girdle, the middle one peripheral, the lower one smaller and forming a suprasutural lira often concealed by the succeeding whorl; 3rd whorl with typically 3 keels, 4th and 5th with typically 3 or 4 (4 keels may develop sometimes on later part of 3rd whorl); additional lirae may develop on 4th and 5th whorls (sometimes on later part of 3rd) between suture and the shoulder keel, between each pair of keels, and also on base, or in the extreme non-cingulate form over the whole whorl and all whorls except the 1st. Outer lip internally plicate or grooved (or both), corresponding with the external girdles and the presence or absence of lirae. 41 × 23 mm. (unicingulate); 35 × 21 mm. (tricingulate); 20 × 13 and 20 × 10 mm. (typical). Smallest examples seen (protoconch plus 2 whorls) 4·5–5 mm. long.

Operculum oval-oblong, nucleus at outer margin, without distinct transverse oval lines.

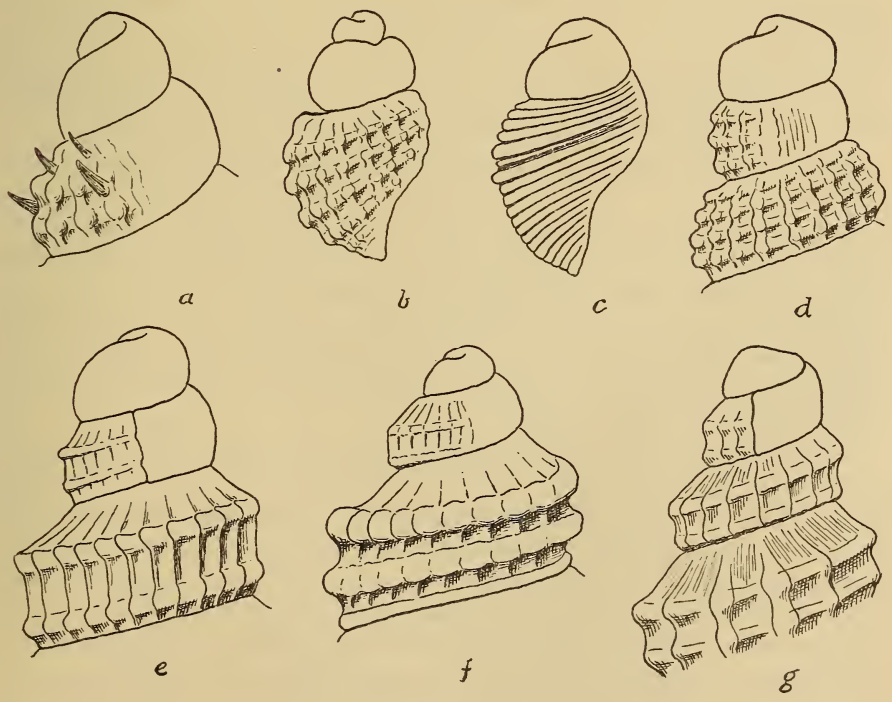

FIG. 49.

(*a*), (*b*) *Thais squamosa* (Linn.), with subscalariform aberration. (*c*) *T. capensis* (Petit). (*d*) *T. wahlbergi* (Krss.). (*e*) *T. dubia* (Krss.). (*f*) *T. cingulata* (Linn.). (*g*) *T. castanea* (Küster).

Grey, buff, or dirty white, operculum horny.

Radula with *c.* 165 rows (shell 10 mm.), *c.* 310 rows (shell 30 mm.), central plate with median cusp longer than side cusps, latter with one denticle on inner margin and 1–2 externally, postero-lateral corner of base acute, lateral plate rather slender.

Table Bay and Dassen Island; False Bay (S. Afr. Mus.).

Living: Port Nolloth (U.C.T.).

Remarks. Krauss gave Natal as well as the Cape as the habitat, but except for Sowerby's (1892) solitary record from Port Elizabeth, there are no records and no examples in S. Afr. Museum from any locality east of False Bay. Dr. Muir did not find it at Still Bay. The Port Elizabeth record is probably another instance of 'domicile of the collector, not of the mollusc'.

The axial ribs are entirely subordinate to the spiral keels on the 2nd and following whorls, but strongly enough developed on 2nd and 3rd whorls to form a clathrate sculpture. On the early whorls the keels are slightly nodular at the intersections, and on later whorls successive major growth-lines (or temporary stoppage of growth) are indicated by slightly irregular junctions.

The variable development of the girdles on the later whorls is even more striking in this species than in *Burnupena cincta* (p. 160). Krauss stated that the girdles varied from 1–4, and sometimes there were none at all. Possibly this statement has acted as a warning to later authors not to give varietal or specific names to the several forms; the extreme forms—5–cingulate (not mentioned by Krauss) and non-cingulate—are certainly very different in appearance.

When well developed (and unworn) the girdles are often very strong, with their upper and lower margins curling over; they may vary in width; and they may also be nearly flat, with little relief above the general surface of the shell, thus grading into the non-cingulate form. When the girdles are suppressed, the lirae are better developed. The non-cingulate form is wholly lirate, the lirae being equally regular in width throughout, or the girdles may be just indicated by slightly wider lirae. In some examples the lirae supersede or obscure the bicingulate and clathrate sculpture on the 2nd whorl which is characteristic of the typical form.

The three hundred (308) available specimens (most of them from a private collection, and probably from Table Bay or the west coast of the Cape Peninsula) seem to show that the tricingulate form is the commonest (185 specimens), the quadricingulate the next commonest (91); there are 12 bicingulate, 8 unicingulate, 6 non-cingulate, and 4 (all large) quinquecingulate. Two others are tricingulate, but the later part of the 4th whorl (? due to injury) suddenly loses one girdle, in one case the 1st, in the other the 3rd girdle. The 12 bicingulates include eleven with 1st and 2nd girdles, but one with 2nd and 3rd girdles; the 8 unicingulates include 2 with the 2nd girdle and 6 with the 1st girdle. There are no unicingulate examples in which the only remaining girdle is the 3rd or 4th.

The non-cingulate form has some similarity with *wahlbergi*, but is distinguished by smaller protoconch, the bicingulate 2nd whorl, and the absence of axial ribs on later whorls.

It also resembles even more closely some froms of *dubia* (e.g. Oudekraal, p. 223), but the protoconch and 1st whorl, and the whole spire, are broader.

Krauss (loc. cit., p. 118) recorded *succincta* from the Cape, but probably Baron von Ludwig's collection contained shells from various localities and possibly not always with locality labels. Lamarck's figures (1816. *Tabl. Encycl. Meth.*, pl. 398, figs. 1*a*, 1*b*) show 8 girdles on the body whorl. Sowerby (1892, p. 13) said the species lives at Madagascar and other eartern localities.

†*Thais praecingulata* (Tomlin MS.) Haughton

1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 48, pl. 5, figs. 6–10.

Fossil, Pleistocene: Alexander Bay, Namaqualand; and Rietvlei, Bredasdorp.

A large species: 95 (apex missing) × 65 mm.

Thais squamosa (Lam.)

Fig. 49(*a*), (*b*)

1816. Lamarck. *Tabl. Encycl. Meth.*, pl. 398, figs. 2 *a*, *b*., and Liste, p. 2 (*Purpura s.*).
1832. Blainville. *Nouv. Arch. Mus. Paris*, i, p. 251, pl. 12, fig. 6 (*Purpura clathrata*).
1903. Smith. *Proc. Mal. Soc.*, v, p. 376 (says *clathrata* is juv.).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 78, also p. 78, pl. 18, no. 565 (*sculpturata*, the right-hand figure, ? the left-hand figure).

Protoconch 2–2½ whorls, alt. and diam. 1 mm. (sometimes alt. 1·3 mm.), smooth. Postnatal whorls 6, 1st sharply demarcated from protoconch. Axial ribs on 1st whorl 18–19, on 2nd 19–20, increasing to 22–25 or more on 5th whorl, where they become confused with the growth-lines, from suture to suture and extending across base; spiral lirae on 1st whorl 2 (3 towards end of whorl, or when not covered by 2nd whorl), on 2nd 3–4, on 3rd 4–5, on 4th and 5th 5, with intermediaries, on base 7 additional lirae with intermediaries, the 3rd (sometimes 2nd) strong and often forming a costa on the body-whorl; intersections of ribs and lirae nodular, on later whorls the nodules transversely oblong, often subsquamose and hollowed in front. Rostrum squamose; aperture (at certain stages of growth) plicate internally. Periostracum with short spiniform processes. 61 (protoconch and 2 whorls missing) × 40 mm.; 44 × 27 mm.; 39 × 24 mm. Protoconch plus 1st whorl 2·5 mm. long.

Operculum oval, nucleus on outer margin below middle.

Brown, uniform or with darker axial streaks, sometimes whitish with brown spiral bands, or bright brown markings and axial streaks.

Radula with *c.* 190 rows (shell 20 mm.), *c.* 285 rows (shell 44 mm.) central plate with median cusp not much longer than side cusps, latter with a denticle

on inner and outer side, margin external to side cusp with 2–3 denticles, lateral plate moderately stout.

Cape and Natal (Krauss); Port Elizabeth and Port Alfred (Sowerby, Bartsch, Turton); Table Bay and Dassen Island (S. Afr. Mus.).

Living: Lambert's Bay, False Bay, and 34° 7′ S. 25° 46′ E., 41 fathoms (U.C.T.). Still Bay (S. Afr. Mus.).

Remarks. Plump and slender forms occur: 26 × 16 mm., and 27 × 14 mm.; 52 × 35 mm., and 52 × 28 mm.

One specimen, 45 × 30 mm., has unusually strong spiral lirae and axial ribs; this is particularly noticeable on the 4th and the beginning of the 5th (body) whorl, producing a very strong clathrate sculpture with deep intervening pits.

The protoconch sometimes sits very prominently on the first whorl.

Thais capensis (Petit)

Figs. 40(*f*), 49(*c*)

1848. Krauss. *Südafrik. Moll.*, p. 117 (*luteostoma*, non Desh.).
1852. Petit. *J. de Conchyl.*, iii, p. 162, pl. 7, fig. 6 (*Purpura c.*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 14 (? var. of *luteostoma*).
1903. Smith. *Proc. Mal. Soc.*, v, p. 376, pl. 15, fig. 21 (*Purpura pura*).
1904. id., *J. Malac.*, xi, p. 32, pl. 2, fig. 15 (*Purpura texturata*).
1919. Cooke. loc. cit., p. 93 (radula).
1923. Tomlin. *J. Conch.*, xvii, p. 47 (*pura* and *texturata* = *capensis* juv.).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 76, pl. 18, no. 554, p. 77 (var. *luteostoma* Desh.), p. 77, pl. 18, no. 556 (*albolineata*), and p. 77 (texturata).
1934. Nardini. *Palaeontogr. Ital.*, 34 (1933), p. 205, pl. 15 (2), figs. 15*a–d* (*Purpura succincta* Mart. var. *natalensis*).

Protoconch 1½–2 whorls, alt. 1·75, diam. 2 mm., smooth. Postnatal whorls 5, 1st not clearly demarcated from protoconch. Spiral lirae on 1st whorl 7, the 5th stronger than the others, on 2nd whorl 10, the 6th and 10th stronger, 6th in middle of whorl, 10th more or less concealed by succeeding whorl (but visible on body-whorl); on 3rd and following whorls lirae increase in number by interpolation; 2 additional strong lirae on base; from 3rd whorl the 2 peripheral lirae become gradually nodose, 9–11 nodules, on last whorl in large specimens 8–9 large blunt nodules, those of the upper series alternating with those of the lower series; growth-lines in interstices between lirae well marked (in fresh specimens) forming a punctate-striate sculpture. 60 (protoconch missing) × 34 mm., 55 (protoconch and 1st whorl missing) × 31 mm., 51 (protoconch and first 3 whorls missing) × 34 mm. (knobs excluded in measurements of width); 41 (incl. protoconch) × 23 mm. Protoconch plus 1st whorl 4·5–5 mm. long.

Operculum oval-oblong, nucleus on outer margin below middle, without distinct transverse oval lines.

Buff, brown, grey, the peripheral lira (lirae) with brown spots corresponding with the knobs, aperture yellowish with brown bands corresponding with

the spaces between the external lirae (or castaneous brown with 4 yellow stripes); worn shells brown or yellowish, with brown spots of the lirae; protoconch whitish, 1st and 2nd whorls sometimes with brown axial streaks; operculum horny-brown. One specimen (S. Afr. Mus.) uniform pale buff, almost white, operculum horny-brown.

Radula with *c.* 95 rows (shell consisting of protoconch plus 1st whorl), at least 160 rows (shell 36 mm.), central plate with median cusp much stronger than side cusps, latter with or without denticle on inner margin, externally no denticles or wrinkles, lateral plate rather stout.

Natal (Krauss, Smith, S. Afr. Mus.); Port Alfred (Smith, Bartsch, Turton, S. Afr. Mus.); Still Bay (S. Afr. Mus.). Cape Agulhas, collected by Verreaux (Petit).

Living: Scottburgh, Natal (Cooke). Off East London, 195 fathoms (S. Afr. Mus. P.F. coll.). Mossel Bay and East London (U.C.T.).

Remarks. In 1886 Sowerby did not agree with Tryon in regarding *capensis* as a variety of the Japanese *luteostoma*; but in 1892, having seen 'an undoubted *luteostoma*' from Port Elizabeth, he was doubtful and remarked that the typical forms were very unlike. As the original provenance of the Port Elizabeth *luteostoma* is very doubtful, and cannot be checked, the Japanese species should be excluded from the South African fauna-list. According to Cooke (1919) there are slight differences in the radulae of the two species. My specimen of *capensis* confirms Cooke's description.

The protoconch is a little larger than that of *Burnupena cincta* and the lirae on 1st portion (or first portion of 1st postnatal whorl) are not so regular in size and spacing, the 5th and 7th lirae being slightly thicker; very fine growth-lines foreshadow the sculpture on the later whorls.

Turton's *albolineata* seems to be merely a very worn specimen.

Nardini had one specimen, 25 × 16 mm., from Umkomaas. Fortunately he gave an enlarged figure (photographic) of the sculpture, which puts the identity with *capensis* beyond doubt.

Thais dubia (Krauss)

Figs. 40(*g*), 49(*e*)

1836. Kiener. *Coq. viv.*, pl. 40, fig. 94 *a* (*Purpura lagenaria* var.).
1848. Krauss. *Südafrik. Moll.*, p. 117.
1889. Sowerby. *J. Conch.*, vi, p. 148 (*scobina*, non Q. & G.).
1892. id. *Mar. Sh. S. Afr.*, p. 14 (*cataracta*, non Chemn.).
1910. Schwarz. *Tr. Geol. Soc. S. Afr.*, xii, p. 114 (*Purpura scobina*).
1919. Cooke. loc. cit., p. 93 (radula) (*cataracta*, non Chemn.).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 77 (*cataracta* and *cataracta dubia*).
1932. id. ibid., p. 77, pl. 18, no. 561 (*pyramidalis* = juv.), and p. 78, pl. 18, no. 562 (*rufanensis* = juv.).
1932. Haughton. *Tr. Geol. Soc. S. Afr.*, xxxiv (1931), p. 47.

Protoconch 1½ whorls, alt. 1, diam. 0·75 mm., smooth. Postnatal whorls 5, 1st marked off from protoconch by a fine plica, or indicated only by the

start of the spiral lirae and the growth-lines. Axial ribs on 1st whorl 15–16, feeble at first and not always distinct from the growth-lines, on 2nd whorl 13–14, on 3rd 11–12; the ribs entirely subordinate to the spiral lirae but forming nodules or vaulted scales or undulations on the lirae at the intersections, usually not continued across base, on later whorls not distinct from the growth-lines; spiral lirae 2 on 1st, 2nd and 3rd whorls, rather far apart, becoming obscure, but usually traceable in good specimens on 4th and 5th whorls, 4–5 additional lirae on base; from 3rd whorl onwards feeble intermediaries may develop: 1 or 2 between suture and 1st lira, one between the 2 peripheral lirae, and one between each pair on the base. 43 (protoconch and 2 whorls missing) × 28 mm., 41 (protoconch and 3 whorls missing) × 28 mm., 24 × 14·5 mm., 23 × 16·5 mm., 20 × 15 and 20 × 11 mm. Protoconch plus 1st whorl 1·75–2 mm. long.

Operculum oval-oblong, nucleus on outer margin, transverse oval lines (thickenings on internal surface) distinct.

Typically pale with dark brown or blackish axial flames from suture downwards, making spots on the lirae, in larger specimens becoming zigzag markings across nearly whole of body-whorl but leaving a more or less clear band around middle. Considerable variation in colour and pattern occurs. There may be dark disconnected irregular blotches, or spiral streaks only; or pale grey or buff with faint yellowish spiral bands; or orange-brown with chestnut spiral bands. Aperture castaneous with a pale band in middle, more distinct in adults than in juveniles; even in the pale almost unicolorous examples where the aperture is only suffused, the pale band is distinguishable though faint; the columella also is more or less suffused. Examples from Langebaan (Saldanha) have a very dark, almost purplish, aperture and columella.

Radula with *c.* 95 rows (shell 13 mm.), *c.* 270 rows (shell 29 mm.), central plate with median cusp longer than side cusps, latter with a denticle on inner and usually also on outer margin, externally one denticle or none, postero-lateral corner of base pointed but not prominent, lateral plate rather stout.

Fossil, Quaternary: Namaqualand (Haughton); Sedgefield near Knysna (Martin); Port Elizabeth (Schwarz).

Cape (Krauss); Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Table Bay, False Bay, Still Bay (S. Afr. Mus.).

Living: Lambert's Bay, Langebaan (Saldanha Bay), west coast of Cape Peninsula, False Bay, Knysna (U.C.T.).

Remarks. Juveniles are slender with sharply pointed spire (*pyramidalis*); this slenderness may be maintained in later whorls, but is usually succeeded by plumpness.

Young specimens with well-marked nodules or vaulted scales on the lirae are different in appearance from smoother adults. An 18 mm. example from sheltered water in Knysna estuary (U.C.T.) has all the growth-lines very well marked with free edges, and the temporary outer lips form squamate projections on each lira.

Sculpture and coloration are often obscured by corrosion and algal growth.

Specimens collected at Oudekraal (west coast of Cape Peninsula) (U.C.T., also K.H.B.) with 4 whorls, 16–17 mm. long, are uniform pale buff or greyish-white, with pale violaceous columella and aperture, the pale internal band faintly visible. Their chief peculiarity, however, is the nearly equal size of the main and intermediary lirae, especially on 4th whorl; the 2nd and 3rd whorls might be described almost as lirate and the body-whorl of one of them is definitely quadrilirate, with 9 lirae on base. One of them fortunately retains the prominent protoconch and narrow bilirate 1st whorl, and thus (together with the pale band in the aperture) indicate their specific identity. The operculum has distinct transverse oval lines.

A specimen in S. Afr. Mus. (Reg. no. 6620. 'South Africa') was identified by J. H. Ponsonby as the New Zealand *Purpura scobina* Q. & G., a species recorded by Sowerby from Port Elizabeth. This specimen, however, is merely a young *dubia*. Sowerby's identification was also probably wrong, and *Haustrum scobinum* should be deleted from the South African fauna-list.

Turton's *pyramidalis* is obviously a young *dubia*. Turton evidently did not realize the slenderness of this species when young; he gives the number of post-nuclear whorls as 6, which seems to be either a misprint or a miscount: a specimen 15 mm. long should have 4 postnatal whorls. His *rufanensis* is a squat form of *dubia* (with apex worn).

Thais wahlbergi (Krss.)

Figs. 40(*h*), 49(*d*)

1848. Krauss. *Südafrik. Moll.*, p. 118, pl. 6, fig. 15 (*Purpura w.*).
1891. Smith. *Proc. Zool. Soc. Lond.*, p. 436, pl. 4, fig. 2 (*Coralliophila w.*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 4 (*Euthria w.*).
1938. Bright. *Trans. Roy. Soc. S. Afr.*, xxvi, p. 62 (*Thais w.*).
1947. Stephenson. *Ann. Natal Mus.*, xi, pp. 273, 274 (*Cominella w.*).
1956. Orr. *Proc. Ac. Nat. Sci. Philad.*, cviii, p. 250 ('*Purpura*' *w.*).

Protoconch 2 whorls, alt. and diam. 1·3–1·5 mm., smooth, prominent when not worn. Postnatal whorls 5½–6, profile convex, not or very feebly shouldered, 1st whorl sharply demarcated from protoconch. Axial ribs often obscure, on 1st whorl 14, on 2nd 12, on 3rd 12–11, on 4th 11–10, thereafter irregular and feeble, from suture to suture, obsolete on base even in juveniles; spiral lirae on 1st and 2nd whorls 3 (on 2nd whorl one or two feebler ones below suture), increasing by interpolation on later whorls, broader and narrower lirae more or less regularly alternating, or 2 fine lirae between a pair of broader ones, the intervals becoming very narrow, merely striae; when fresh and unworn the close-set lines of growth make the lirae crispate (Smith) or finely scabrous, and the striae punctate. Sculpture cancellate (transversely oblong hollows) on first 2 whorls, on later whorls spirally lirate/striate, with only feeble and irregularly spaced axial ribs. Rostrum rimate. Canal when fully developed nearly closed,

Outer lip sometimes thickened with a varix, internally plicate. 47 × 21 mm. Protoconch plus 2 whorls 5·5 mm.

Operculum oval, nucleus on outer margin near apex, oblique (not transverse) oval thickenings across centre of inner surface, not visible externally.

Grey or dirty whitish, operculum pale horny.

Radula very long, at least 360 rows, central plate with median cusp arising on front margin, side cusp with a denticle on inner margin and one or two denticles externally, lateral plate rather slender.

Animal cream-coloured, eyes very small, black.

Living: off Sea Point (Cape Town) (Smith; also S. Afr. Mus.); Oudekraal (west coast of Cape Peninsula), Langebaan (Saldanha Bay), and Port Nolloth (U.C.T.). Saldanha Bay (Orr).

Remarks. The fine crispate lirae, with intervening punctate striae, make a characteristic sculpture.

Plump and slender forms occur: 43 × 23, 46 × 22, 46 × 20 mm.

Apparently a west coast species. Krauss's locality 'Natal' has not been confirmed, and there are no records from any intermediate localities.

Sowerby put this species into *Euthria* in spite of Krauss saying the operculum was Purpuroid. According to the radula it can be included in *Thais*. Orr has suggested in or near *Urosalpinx*.

Thais castanea (Küster)

Figs. 40(*i*), 49(*g*)

1886. Küster. *Conch. Cab.*, p. 170, pl. 28, figs. 8, 9 (*Purpura c.*).
1886. Sowerby. *J. Conch.*, v, p. 3 (*Cominella unifasciata*).
1892. id. *Mar. Sh. S. Afr.*, p. 11, pl. 1, fig. 11 (*C. unifasciata*).
1897. id. *Append. Mar. Sh. S. Afr.*, p. 4 (*C. unifasciata* var. *concolor.*).
1938. Eyre and others. *Ann. Natal Mus.*, ix, p. 110 (*Cominella c.*).
1938. Peile. *Proc. Mal. Soc.*, xxiii, p. 99, fig. 35 (radula).

Protoconch 1½ whorls, alt. and diam. 0·75 mm., smooth. Postnatal whorls 5, start of 1st whorl distinct. Axial ribs on 1st whorl 10–11, but not very distinct, on 2nd and following whorls 10 (sometimes only 9), forming distinct blunt knobs at intersections with spiral lirae, more distinct on the upper than on the lower lira, often obscure on last part of 5th whorl, in fresh specimens the knobs are squamate, hollow in front; ribs not crossing base; spiral lirae on 1st and following whorls 2, the upper some little distance from the suture, the lower just above and often partially obscured by the succeeding whorl, sometimes a fine intermediary between the two; on base 4 additional lirae, often more distinct in juveniles than adults, sometimes with fine intermediaries; growth-lines producing a very finely striate appearance. Outer lip plicate internally. 15 × 7·5 mm. Protoconch plus 2 whorls 2·5 mm. long.

Operculum oblong-oval, nucleus on outer margin, no distinct transverse oval lines.

Castaneous-brown, usually with the protoconch and 1st whorl, or 1st and 2nd whorls, white; or brown with a white band in middle of body-whorl; or white with a brown band below the suture; or uniform white.

Radula with *c.* 130 rows, central plate with median cusp larger than side cusp, latter with denticle on inner margin, externally 2–3 denticles, lateral plate stout. Peile said the radula was shorter than those of many species of the family (*Thaididae*), only 88 rows. His examples were probably young.

Cape (Kuster), Natal (Sowerby), Port Alfred (Smith, Bartsch, Turton); Pondoland and Still Bay (S. Afr. Mus.).

Off Tugela River (Natal), 65–80 fathoms, one dead but fresh; off East London, 45 fathoms, dead but fresh; off Sandy Point (north of Kei River), 51 fathoms (S. Afr. Mus. P.F. coll.).

Living: East London, and Still Bay (U.C.T.).

Thais distinguenda (Dnkr.)

1852. Dunker. *Reise Novara. Moll.*, figs. 1–3.
1880. Von Martens. *Mauritius & Seychellen*, p. 236 (as var. of *hippocastanum*).
1919. Cooke. loc. cit., p. 95, fig. 4 (radula) (*intermedia*, 'usually regarded as var. of *hippocastanea*' [*sic*]).
1952. Satyamurti. *Bull. Madras Govt. Mus.*, n.s. I, 2, pt. 6, p. 167, pl. 16, fig. 5 (*intermedia*).
1952. Braga. *Anais Est. zool. Ultramar.*, vii, 3, pl. 3, fig. 4 (as *Ricinula tuberculata* Blainv.).

Radula with *c.* 250 rows (shell 28 mm.) to 290 rows (shell 38 mm.), central plate with median cusp longer than side cusps, latter with denticle on inner margin, 3 denticles or wrinkles externally, lateral plate moderately stout.

Living: Umpangazi (Zululand) (U.C.T.). Delagoa Bay and Mozambique Island (K.H.B. coll., and U.W.). Ponta do Ouro (Mozambique) (Braga).

Distribution. Nicobars, Mauritius, Indo-Pacific.

Remarks. The U.C.T. specimens came to me labelled *intermedia* (Kiener). Mr. Salisbury has identified a specimen as *distinguenda* (var. *savignyi* Desh.); and the specimens are here recorded under this name. Braga's illustration seems to agree with these specimens.

Von Martens regarded *distinguenda* as synonymous with *hippocastanum* (Linn.) var. *intermedia* (Kien.). He mentioned the variation in colour of the columella: dark with a white stripe (*intermedia*), brownish with paler patches (*hippocastanum* s.s.) whitish (*savignyi*). Some of the present specimens resemble *hippocastanum*, but most of them correspond better with *savignyi*.

Thais bitubercularis (Lam.)

1822. Lamarck. *Anim. sans. Vert.*, vii, p. 237 (*Purpura b.*).
1836. Kiener. *Coq. viv.*, p. 49, pl. 11, fig. 32.
1859. Chenu. *Man. Conchyl.*, i, fig. 803.
1919. Cooke. loc. cit., p. 92 (radula).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 169, pl. 7, figs. 7 *a*, *b*.

Radula with *c.* 195 rows, central plate with median cusp much stronger and longer than side cusps, a separate small denticle between median and side

cusps, externally 2 minute denticles or wrinkles, lateral plate rather stout.

Living: Delagoa Bay (U.W.).

Distribution. Karachi (Cooke). East Indies.

Thais gemmulata (Lam.)

1764. Linne. *Mus. Ulricae*, p. 636 (*mancinella* part).
1816. Lamarck. *Tabl. Encycl. Meth.*, p. 397, figs. 3 *a*, *b*, and Liste des planches, p. 2.*
1848. Krauss. *Südafrik. Moll.*, p. 117 (*mancinella*).
1880. Von Martens. *Mauritius & Seychellen*, p. 235 (*mancinella*).
1892. Sowerby. *Mar. Sh. S. Afr.*, p. 14 (*mancinella*).
1906. Hedley. *Proc. Trans. Linn. Soc. N.S.W.*, xxxiii, p. 457.
1913. Smith. *Proc. Mal. Soc.*, x, p. 288.
1919. Cooke. loc. cit., p. 92 (radula).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 170, pl. 7, fig. 6 (*mancinella*).
1956. Day & Morgans. *Ann. Natal Mus.*, xiii, p. 307 (*mancinella*).

Living: Durban Bay (Cooke, S. Afr. Mus., and U.C.T.); Umpangazi (Zululand) (U.C.T.); Delagoa Bay (U.W.).

Collected in Durban Bay by Burnup, and K.H.B. 'Fairly common' in the harbour entrance (U.C.T.). The large specimen (*v. infra*: *echinata*) was taken by the *Pieter Faure* at the jetty.

Distribution. Mauritius, Madagascar, Seychelles, Indo-Pacific.

Remarks. The large 6-whorled *Pieter Faure* specimen was returned by Sowerby labelled as *echinata* (Blainv.). As it differs from the smaller specimens only in having stronger tubercles I am assigning it to *gemmulata*.

In live shells (and in dried shells when wetted) the pale lirae on the apical whorls make a pretty contrast with the reddish ground colour.

One specimen in S. Afr. Mus. (? H.M.S. *Castor*, east coast of Africa), 5 whorls, 42 × 31 mm., has an extra series of low blunt knobs below the suture on 4th and 5th whorls, corresponding with the shoulder and peripheral knobs, 10 on 4th, 8 on 5th whorl.

Smith gave reasons for adopting Lamarck's name instead of *mancinella* Linn.

Thais (*Cymia*) *carinifera* (Lam.)

1822. Lamarck. *Anim. sans Vert.*, vii, p. 241 (*Purpura c.*).
1836. Kiener. *Coq. viv.*, p. 62, pl. 14, fig. 38 (*Purpura c.*).
1852. Souleyet. *Voy. Bonite*, ii, p. 603, pl. 40, figs. 4–6.
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 354.
1919. Cooke. loc. cit., p. 93 (radula).
1952. Braga. *Anais Est. zool. Ultramar.*, vii, 3, p. 77, pl. 3, fig. 6 (*Cuma c.*).

One somewhat worn specimen, 4 whorls, apex broken, 46 × 33 mm., dirty white, corresponding with Braga's figure except that the lira above the

* In the S. Afr. Mus. copy, which belonged to Swainson, the name 'mancinella' is written under fig. 3 in Swainson's handwriting.

peripheral tubercles becomes crested at the outer lip and thus forms a prominent tooth on the margin.

The specimen (S. Afr. Mus. A7688) is said to have come from Natal, but more probably it came from Delagoa Bay, whence Braga recorded the species.

Two young specimens, 22 (protoconch worn) × 15 mm., 4 postnatal whorls, from Inhambane (U.C.T.) seem to belong to this species. They have 8 tubercles on each whorl (the above larger specimen has 9), 8–9 main lirae between suture and peripheral tubercles, with intermediaries; numerous lirae on base, the strongest one running from top of aperture and carrying tubercles corresponding with the peripheral series; growth-lines crispate; costa on rostrum rounded (not sharply keeled). Greyish, columella whitish, aperture internally purplish-brown, operculum amber.

Radula with 180 and 220 rows (two radulae), central plate with median cusp very long and narrow, 3 times as long as side cusps, latter with denticle on inner side, externally 4–5 well-marked denticles, one or two of them ascending the cusp (cf. Cooke's description).

Distribution. Karachi, East Indies, Philippine Is.

Gen. Drupa Bolten

1919. Cooke. *Proc. Mal. Soc.*, xiii, p. 100 (radulae).

This Indo-Pacific genus extends down the east coast of Africa to Natal. The most southerly locality is Port Edward (living *squamosa*, U.C.T.). *D. alfredensis*, although named after Port Alfred, probably came from Natal (if it was a South African shell!). Sowerby's record of *tuberculata* (*granulata*) from Port Elizabeth is open to doubt; and Gould's record of *parvulum* from Simon's Bay (False Bay) is certainly not acceptable (possibly Gould may have had a *Tritonalia scrobiculata* or a young *Thais dubia*).

Drupa squamosa (Pease)

Fig. 50(*a*)

1868. Pease. *Amer. J. Conch.*, iii, p. 277, pl. 23, fig. 14 (*Sistrum s.*).
1919. Cooke. loc. cit., p. 101 (radula).

Radula with *c.* 190 rows, central plate with long narrow median cusp, side cusp with one denticle on inner margin, externally 3–5 denticles, ascending the cusp, lateral plate with base scarcely one-third width of central plate, blade slender.

Living: Durban and Scottburgh (Cooke); Port Edward, Umhlanga, and Kosi Bay (U.C.T.); Maxixe, Portuguese East Africa (U.C.T.); Mozambique Island (U.W.).

Distribution. Indo-Pacific.

Drupa anaxares (Duclos MS. Kiener)

1843. Kiener. *Coq. viv.*, vii, p. 26, pl. 7, fig. 17.
1919. Cooke. loc. cit., p. 105 (radula) (*Morula a.*).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 159, pl. 6, fig. 14 (*anaxeres*).

Living: Umkomaas, Natal (Cooke). Mozambique Island (U.W.).

Drupa granulata (Duclos)

Fig. 50(*b*)

1832. Duclos. *Ann. Sci. Nat.*, xxvi, p. 111, pl. 2, fig. 9 (*Purpura g.*).
1832. Blainville. *Nouv. Arch. Mus. Paris*, i, p. 204, pl. 9, fig.
1919. Cooke. loc. cit., p. 106 (radula) (*Morula g.*).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 159, pl. 6, fig. 13 (*tuberculata*).

Radula with *c.* 160 rows, central plate with strong median cusp, nearly twice as long as side cusps, latter with a denticle on inner margin, externally with one denticle, lateral plate with base about half width of central plate, blade slender.

Living: Isipingo, Natal (Cooke); Durban (S. Afr. Mus., and U.C.T.); Mozambique Island (U.W.).

Distribution. Indo-Pacific.

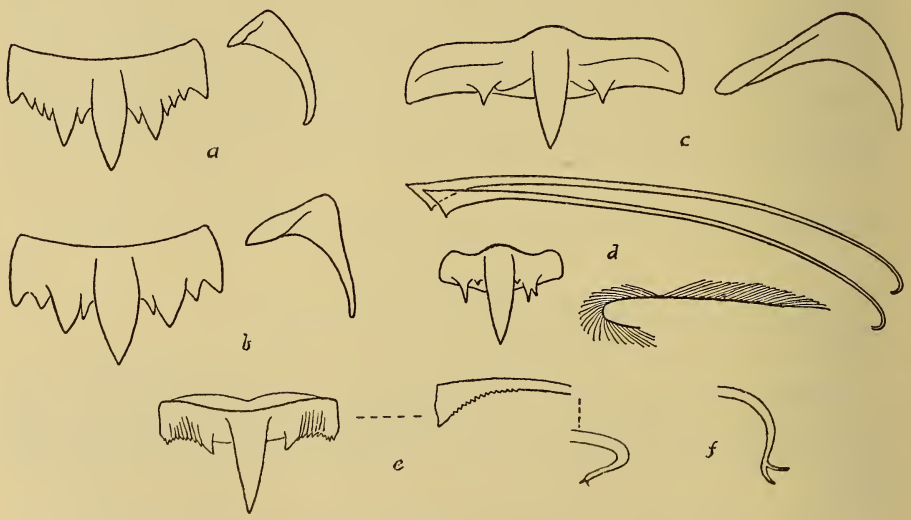

Fig. 50.

Central and lateral radula plates of (*a*) *Drupa squamosa* (Pease); (*b*) *D. granulata* Duclos; (*c*) *D.* (*Cronia*) *margariticola* Brod.; (*d*) *Drupella* sp. specimen C, with diagram of orientation of lateral plates on the basal membrane; (*e*) *Drupella* sp. specimen B; (*f*) *Drupella* sp. specimen A, apex of lateral plate.

Remarks. Cooke described a radula in the Gwatkin collection labelled *granulata* from Isipingo, and a radula of a Mauritian *tuberculata*, in both of which the median cusp of the central plate was shorter than the side cusps (this might apply to the much-worn plates at the front end of a radula). The present description is taken from specimens collected by myself at Durban, the shells of which correspond with shells identified by Burnup.

Drupa squamilirata (Smith)

Fig. 40(*e*)

1903. Smith. *Proc. Mal. Soc.*, v, p. 377, pl. 15, fig. 17 (*Sistrum s.*).

Protoconch 2 whorls, alt. and diam. 0·75 mm., smooth. Postnatal whorls 5, profile angularly shouldered in middle of whorl or slightly below; axial ribs 9 on 1st whorl, 9–10 on following whorls, from suture to suture, broad, the periphery an undulate outline in apical view, petering out on base; crossed by one peripheral lira on 1st and 2nd whorls, by the peripheral lira and one below it on 3rd, by 4 lirae above and one (or 2) below the peripheral one on 4th and 5th whorls, 9–10 additional lirae on base, with fine intermediaries. Growth-lines crispate. Costa on rostrum rounded. Columella rimate anteriorly. Canal open; outer lip internally plicate. 13 × 7 mm. Smith: 19 × 10 mm. White.

Operculum oval-reniform, nucleus in middle of outer margin.

Radula with *c.* 100 rows, central plate with median cusp much longer than side cusps, latter with denticle on inner margin, but no denticles externally, lateral plate rather slender.

Isipingo (Smith, coll. Burnup); Scottburgh (S. Afr. Mus., coll. Burnup).

Off Morewood Cove (near Umhloti, Natal), 27 fathoms, 4 alive; off Umhlanga River, 22–26 fathoms, 3 (one alive); off Tongaat River, 36 fathoms, one fragment (S. Afr. Mus. P.F. coll.). 29° 58′ S. 31° 02′ E., 49 metres (U.C.T.).

Remarks. In general appearance like the Mediterranean and West African *Trophon fusulus* (Brocchi) as figured by Knudsen (1956. *Atlantide Rep.*, 4, pl. 3, figs. 4, 5).

Subgen. *Cronia* H. & A. Adams

Drupa margaritiicola Brod.

Fig. 50(*c*)

1795. Chemnitz. *Conch. Cab.*, xi, p. 124, pl. 192, figs. 1851, 1852 (*Murex undatus*, part).
1832. Broderip. *Proc. Zool. Soc. Lond.*, p. 177 (*Murex m.*).
1919. Cooke. loc. cit., p. 107 (radula) (*Morula undata*).
1938. Adam & Leloup. *Mem. Mus. Roy. Hist. Nat. Belg.*, H.S. II, 19, p. 161, pl. 6, fig. 16.

Animal black. Radula with *c.* 135 rows, strongly 'chitinized', brown, blackish posteriorly, central plate very wide, median cusp much stronger than

side cusps, scarcely a trace of a denticle between them, lateral plate base wide, more than half width of central plate, blade shorter than base.

Durban, Delagoa Bay (Sowerby); Isipingo, Natal (S. Afr. Mus. coll. Burnup).

Living: Delagoa Bay, Nacala, and Mozambique Island (U.W.).

Distribution. Indo-Pacific.

Remarks. The radula of a Delagoa Bay specimen is quite different from that described by Cooke from Karachi and Isipingo specimens, and resembles that of *D.* (*Cronia*) *amygdalus* (Cooke, fig. 33).

Gen. Drupella Thiele

1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 171, figs. 3, 4 (radula) (as subgen.).
1929. id. *Handbuch*, i, p. 295, fig. 321 (radula) (as subgen.).
1939. Peile. *Proc. Mal. Soc.*, xxiii, pp. 273–6.

Distinguished by the slender elongate lateral plates of the radula; supposed to be an adaptation to feeding on certain kinds of coral (Cooke, 1895).

Drupella sp.

Fig. 50(*d*)–(*f*)

Three shells from Delagoa Bay (U.W.), 16–18 × 10 mm., are so corroded and overgrown with calcareous growth that identification is almost impossible (cf. Peile). They seem, however, to agree with Scottburgh (Natal) examples in S. Afr. Mus. collected and named by Burnup as *elata* Blainv. The outer lip in all of them is internally denticulate, and the columella feebly granulate at the anterior end. Two (A and B) have the columella and margin of outer lip white, but farther inside the aperture is yellowish; the third (C) has the aperture within, the columella and the outer lip margin pinkish-orange. Animals black.

Although externally the shells seem alike (except the coloured aperture in C), their radulae differ in minor details. In general they resemble Peile's fig. 45 of a specimen from Samoa. Peile also recorded a second shell, with similar radula, which had features 'in common with *elata*'.

Specimen A. At least 260 rows, central plate with very strong median cusp, no denticle between it and side cusp, and no denticles or wrinkles externally, lateral plates 4–5 times as long as width of central plate, in ratio of approximately 12 to 10 centrals (cf. Peile, p. 274), base not serrate, apex bifid (fig. 50(*f*)).

Specimen B. About 100 rows, central plate with strong median cusp, no denticle between it and side cusp, externally several wrinkles ending in fine sharp denticles, lateral plates about 3 times as long as width of central plate, in ratio of 2 or 3 to each central, base serrate, apex extremely finely bifid (fig. 50(*e*)).

Specimen C. About 150 rows, central plate with strong median cusp, a tiny denticle between it and side cusp, the side cusp of the right side has also a denticle about midway on its outer margin, externally no wrinkles or denticles, lateral plates about 4 times as long as width of central plate, in ratio of 2 or 3 to each central, base not serrate, apex not bifid (not even on the unused portion of radula) (fig. 50(*d*)).

In radula C it was observed that on the anterior third (*c.* 46 plates) the laterals were directed forwards, on the hinder two-thirds (*c.* 104 plates) backwards. cf. *Cancellaria* (Barnard, 1958. *J. Conch.*, xxiv, p. 243, fig.) (fig. 50(*d*) diagram).

Urosalpinx heptagonalis (Rve.)

Fig. 40(*j*)

1846. Reeve. *Conch. Icon.*, iii, pl. 3, fig. 7 (*Ricinula*), and fig. 53 (*Buccinum contractum*).
1879. Smith. *Proc. Zool. Soc. Lond.*, p. 201, pl. 20, fig. 32 (*innotabilis*).
1884. id. *Zool. H.M.S. Alert*, p. 47.
1903. id. *Proc. Mal. Soc.*, v, p. 376 (*contracta*).
1911. Schepman. *Siboga Exp. monogr.*, xlix, p. 351 (*contracta* var. *innotabilis*).

Protoconch 2 whorls, alt. 0·5, diam. 0·6 mm., smooth. Postnatal whorls 6. Axial ribs on 1st whorl 10–9, on 2nd and 3rd 9, on 4th and 5th 9–8, on 6th 8; crossed by 2 spiral lirae on 1st and following whorls, on 3rd a fine lira between them, increasing to 4 (5) on last whorl, fine spiral lirae also above the upper and below the lower lira; complanate nodules at intersections with ribs; 15 additional lirae on base, of which the 5th (and sometimes also the 8th) is stronger than the others, so that on the body-whorl there are 3 prominent lirae: a peripheral pair, and one (sometimes 2) between these and end of rostrum. Outer lip plicate within (at certain stages of growth). Growth-lines scabrous. 33 × 18 mm.

Operculum oblong-oval, nucleus on outer margin.

Grey, drab, or fawn, the peripheral and the enlarged basal lirae usually darker, or darker brown or bluish-grey where they cross the ribs; often also a darker band below suture; aperture suffused within, brown at the margin; operculum horny.

Radula with 90–100 rows, central plate wide, median cusp large, arising from front margin of base, side cusp smaller, with a denticle between it and median cusp, lateral plate rather slender; hinder rows coloured brown.

Natal (Krauss); Durban (Smith, and S. Afr. Mus.). Morewood Cove (near Umhloti, Natal), 27 fathoms (S. Afr. Mus. P.F. coll.).

Living: off Umhloti River, 27 fathoms; off Tongaat, 36 fathoms (S. Afr. Mus. P.F. coll.). Inyoni Rocks (Amanzimtoti, Natal), and 29° 58′ S. 30° 02′ E., 49 metres (U.C.T.). Delagoa Bay (U.W.). Inhambane (U.C.T.). Mozambique Island (S. Afr. Mus. coll. K.H.B.).

Distribution. Indo-Pacific.

Remarks. The upper whorls are frequently corroded or covered with calcareous algal growth.

There are broad-shouldered and round-shouldered forms.

Smith (1879) remarked that *Murex calcareus* Dnkr. was very close to *innotabilis* and Sowerby returned the P.F. specimen from Tongaat labelled *Tritonidea* [sic] *calcarea* Dnkr.

Rapana bulbosa (Solander)

Fig. 51(*a*)

1859. Chenu. *Man. Conchyl.*, i, fig. 842.
1919. Cooke. *Proc. Mal. Soc.*, xiii, p. 102, fig. 29 (radula).
1942. Gravely. *Bull. Madras Govt. Mus.*, n.s. V, 2, p. 48, fig. 8 *a*.
1952. Satyamurti. ibid., n.s. I, 2, pt. 6, p. 151, pl. 14, figs. 2 *a*, *b*.

Protoconch 2 whorls, alt. and diam. 1 mm., smooth but minutely pitted, ending with a sharp plica. First postnatal whorl with numerous feeble axial ribs, one spiral lira in middle of whorl and another below adjoining suture of next whorl; both lirae become stronger on following whorls, especially the upper one on which 8 or 9 vaulted squamae or hollow tubercles develop; the number of these increases on later whorls, becoming solid tubercles or knobs. 100 (protoconch and 2 whorls missing) × 87 mm. (S. Afr. Mus.).

Radula (Cooke): central plate tricuspid, cusps broad, median one slightly larger than side cusp, which has a denticle on its inner margin, externally several wrinkles.

Durban (Smith, and (living) Cooke).

Off Umhloti River, 27 fathoms, 5 dead but fresh, 10–33 mm. long (S. Afr. Mus. P.F. coll.).

Distribution. Indo-Pacific.

Gen Aspella Mörch

1877. Mörch. *Malak. Bl.*, xxiv, p. 24.
1929. Thiele. *Handbuch*, i, p. 293.

Removed from the *Cymatiidae* and placed by Thiele in the *Muricidae*. Radula formula 1.1.1, central plate tricuspid, a smaller cusp between the median and side cusps, lateral plate unicuspid.

Aspella acuticostata (Turton)

Fig. 51(*b*)

1892. Sowerby. *Mar. Sh. S. Afr.*, p. 9 (*Ranella lamellosa*, non Dnkr.).
1903. Smith. *Proc. Mal. Soc.*, v, p. 378 (*Ranella anceps*, non Lam.).
1915. Bartsch. *Bull. U.S. Nat. Mus.*, 91, p. 95 (*anceps*, non Lam.).
1932. Turton. *Mar. Sh. Pt. Alfred*, p. 109, pl. 24, no. 789 (*Ranella a.*).

Aperture (excl. canal) nearly twice in spire, canal 1½ in aperture. Protoconch 1½ whorls, alt. 0·5, diam. 0·6 mm., smooth, ending with a small plica or

varix extending from suture to suture, followed by a half whorl (perhaps this is postnatal) with 3 plicae or varices the first of which ascends nearly to the top of preceding whorl of protoconch. Postnatal whorls 5; each whorl with 6 varices, of which the 2nd, 3rd, 5th and 6th are stronger than the others, and extend farther over the suture on to the preceding whorl; a cross-section of the shell is a parallelogram, not quite rectangular, with one of the prominent varices at each corner; the strong varices extend across base of body-whorl to rostrum. Growth-lines visible in some places; no spiral sculpture, but there are faint indications of 6 or 7 crenulations on last varix (outer lip). 9 × 4 mm. Creamy-white.

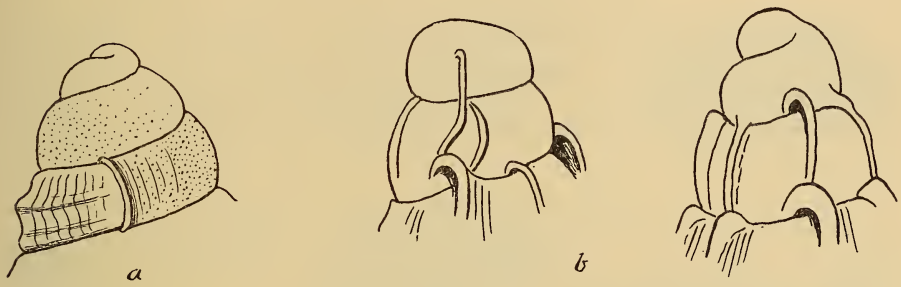

Fig. 51.
Protoconch of (*a*) *Rapana bulbosa* (Sol.).; (*b*) *Aspella acuticostata* Turton.

Port Elizabeth (Sowerby); Port Alfred (Bartsch, Turton); Umkomaas, Natal (Smith); Still Bay (S. Afr. Mus. coll. Muir).

Remarks. The above description is taken from a specimen identified by Tomlin as *A. anceps* Lam. Bartsch said the South African species was different; he gave the type locality for *anceps* as west coast of America (presumably *South* America, because it is not mentioned in Oldroyd, 1927. *Stanford Univ. Publ. Geol.*, II, pt. 2). If Bartsch is correct, Turton's name must be accepted.

The specimen described is only slightly corroded, chiefly on the edges of the varices. It is said to have come from Natal.

The other S. Afr. Mus. specimens, up to 11 (protoconch missing) × 4·5 mm. are all beach-worn. From these the following characters are obtained: aperture (excl. canal) 1⅓ (juv. with 2 postnatal whorls) to 1½ (3 whorls) to 2 times in spire; canal 1½ times in spire.

Turton gave the size as 15 × 6 mm.

In well-worn specimens the cross-section of the shell is nearly oval with one prominent varix at each end (i.e. nos. 3 and 6), the other prominent varices (2 and 5) being nearly obliterated. At first sight a worn and an unworn shell appear rather different.

S. Afr. Mus. has 2 worn specimens said to have come from Mauritius (Robillard coll.), the larger with 7 whorls (protoconch missing) 20 × 8 mm. Each whorl has 8 ribs or varices, i.e. 3 on each face between the main lateral varices.

Fam. *COLUMBARIIDAE*

1922. Peile. *Proc. Mal. Soc.*, xv, pp. 13, 14, fig. (radula) (near *Muricidae*).
1925. Thiele. *D. Tiefsee Exp.*, xvii, p. 167 (in *Muricidae*).
1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 330 (separate family).

Characterized by the operculum: pear-shaped, tapering rapidly and evenly to an acute nuclear apex, internal surface as in *Fasciolaria*; and by the radula: central plate strongly concave in front, with 3 cusps, the middle one the largest, lateral plate longer than its basal width.

Gen. Columbarium von Martens

Three forms occur at different depths off Cape Point, two of which are regarded as new species. *C. radiale* (Watson) and *angulare* n. sp. are both quite distinct from *rotundum* n. sp.; *radiale* and *angulare* are not so distinct from one another, but their habitats are separated by the area inhabited by *rotundum.*

Columbarium radiale (Watson)

Fig. 52(*a*), (*b*), (*e*)

1882. Watson. *J. Linn. Soc. Lond.*, xvi, p. 382 (*Fusus r.*).
1886. id. *Challenger Rep.*, xv, p. 195, pl. 14, fig. 2 (*Fusus r.*).
1903. Von Martens. *D. Tiefsee Exp.*, vii, p. 29 (*Fusus r.*).

Spiral lirae predominant. Aperture (incl. canal) $1\frac{1}{3}$–$1\frac{1}{2}$ (or even slightly more) times spire. Protoconch $2\frac{1}{2}$ whorls, alt. 2·3, diam. 2 mm. (but more or less corroded), smooth, with indications of axial plicae on last half whorl. Postnatal whorls 7, profile carinately angular. Axial ribs on 1st whorl 10–11, increasing on following whorls to 13, and to 15—20 on last whorl, from suture to suture on 1st and 2nd whorls, but thereafter evanescent above and below the peripheral keel, on which they form bluntly triangular complanate lobes, distinct as far as 6th whorl but feeble and indistinct on 7th; spiral lirae on 1st whorl 3, i.e. one above and one below the prominent peripheral keel, on 2nd and following whorls 2 above and 2 below, on later whorls there may be 2, 3 or 4 lirae above but only 2 (sometimes with a feeble intermediary) below the periphery, and the lower one is often obscured by suture of following whorl; 15–20 additional lirae on base, widely spaced above, closer and less conspicuous on rostrum; close-set growth-lines between the lirae; suture incised, more or less undulate; no parietal callus, columella straight or very slightly curved; canal straight, narrow, distinctly marked off from, and 2–$2\frac{1}{2}$ times as long as rest of aperture, subequal to spire; outer lip not plicate within. Periostracum thin, fibrous, fimbriate. Estimated length of largest specimen (protoconch and tip of canal broken) 74 × 27 mm.; living examples 55 × 21 mm., 47 × 15 mm.

Operculum as described under family, 9 × 6 mm. in 47 mm. shell.

White, periostracum buff or yellowish-brown, operculum amber-brown.

Radula with 120–130 rows, as described under family (fig. 52(*e*)).

Dead: 35° 4′ S. 18° 37′ E., 150 fathoms (Watson); 34° 33′ S. 18° 21′ E., 318 metres (von Martens).

Living and dead: off Cape Point and west coast of Cape Peninsula, 90–230 fathoms (S. Afr. Mus. P.F. coll.).

Living: 35° 17′ S. 18° 50′ E., 267 metres (s.s. *Africana*).

Remarks. Von Martens (1903) had already suspected this species to be a *Columbarium*, and its appearance is so like a species of this genus that confirmation by the radula was no surprise.

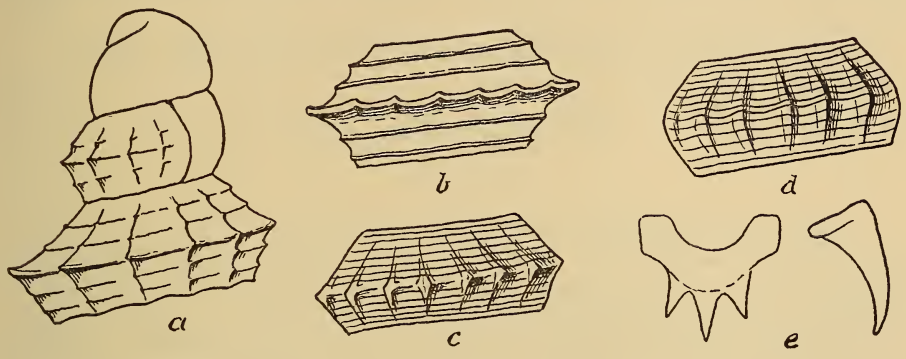

Fig. 52.

(*a*), (*b*) *Columbarium radiale* (Watson), apex and later whorl. (*c*) *C. angulare* n. sp. (*d*) *C. rotundum* n. sp. (*e*) central and lateral radula plates of *C. radiale* (Watson).

Columbarium angulare n. sp.

Fig. 52(*c*)

Axial ribs distinct. Protoconch 2½ whorls, alt. 1·5, diam. 1·3 mm., smooth but a faint median lira on last half whorl. Postnatal whorls 7, profile angulate but not carinate; axial ribs on 1st whorl 10–11, on 2nd 10–12, on 3rd and following whorls 12 (sometimes 13), forming bluntly triangular lobes at intersections with the peripheral lira, from suture to suture on early whorls, but gradually receding from the suture above on later whorls, on body-whorl distinct below periphery as far as level of top of aperture, evanescent on base; spiral lirae distinct but not predominant, the peripheral lira well marked but not carinate as in *radiale*, on 1st whorl 2 above and 2 below peripheral lira, on 2nd 3 above and 2 below, on 3rd 4 above and 2 below, increasing to (7) 8–9 above and 5–6 below, equal in strength but usually 2 of those below periphery stronger than the others; on base at least 15–20 additional lirae with intermediaries. Periostracum thin, fibrous, fimbriate. 51 (protoconch missing) × 13 mm.

Operculum and radula as in *radiale*. The radula with 85–95 rows. Three radulae were examined; in one of them the side cusps on the central plate were

closely approximate to the median cusp, not separated by a V-shaped interval as in the other two (and in the radulae of the other species).

White, periostracum pale buff, operculum amber-brown.

Off Cape Point, 720–900 fathoms, 9 specimens, 4 alive (S. Afr. Mus. A4608 (Type)–A4611. P.F. coll.).

Remarks. A smaller and more slender species than *radiale*: 51 × 13 mm. with 7 postnatal whorls whereas *radiale* has only 6 whorls at a size 55 × 21 mm.

Although the peripheral lira is strong, sometimes almost subcarinate, the lobes at the intersections with the axial ribs are not complanate but 4-sided pyramids, the ribs being more strongly developed than in *radiale*. The spiral lirae above and below the periphery are more numerous.

Occurs in deep water beyond the slope of the continental shelf.

Columbarium rotundum n. sp.

Fig. 52(*d*)

Axial ribs predominant. Protoconch ? (corroded in all specimens). Postnatal whorls 7, profile almost evenly convex with only a slight shoulder in the middle of the whorl and slightly concave above. Apical whorls more or less corroded, axial ribs on 3rd whorl 10, on 4th 10–11, on 5th 11–12, on 6th 12–13, on 7th 13 (14), from suture to suture on 3rd whorl, but gradually receding from suture above on later whorls, on body-whorl distinct below periphery as far as level of top of aperture, evanescent on base; spiral lirae subordinate to the ribs, on 3rd whorl 3 above, one at shoulder, 3 below, increasing on following whorls to 7–8 above and 4–5 (unequal in strength) below; on base at least 15–20 additional lirae with intermediaries. Periostracum thin, fibrous, fimbriate. 75 (protoconch missing) × 25 mm.

Operculum and radula as in *radiale*. The radula with 130–160 rows.

White, periostracum pale buff, operculum amber-brown.

Off Cape Point, 250–760 fathoms, numerous specimens living and dead (S. Afr. Mus. A4592 (Type)–A4607. P.F. coll.).

Remarks. Distinct from *radiale* and *angulare* by the rounded non-angulate profile of whorls, and the predominant axial ribs.

Seems to be subject to much more corrosion than either of the other two species.

Occurs on the outer slope of the continental shelf in deeper water than *radiale*, but not in such deep water as *angulare*.

Columbarium formosissimum Tomlin

1928. Tomlin. *Ann. S. Afr. Mus.*, xxv, p. 331, pl. 25, fig. 1.

Protoconch 2 whorls, bulbous, alt. 1·5, diam. 1·3 mm., smooth, junction with 1st postnatal whorl not sharply marked, the keel on the latter feeble at

the start. Postnatal whorls 7 (incl. the Type, though Tomlin said 8). Peripheral keel on 1st and 2nd whorls not or only feebly undulate, on 3rd with 8 low and somewhat irregular undulations, on 4th with 8 well-marked but slightly irregular undulations, on 5th with 9 lobes, on 6th 10, on 7th 11; the lobes may be blunt or sharply triangular, sometimes hollowed in front. Periostracum thin, fibrous, pale buff.

Radula with *c.* 100 rows.

Cape St. Blaize N. × E. ¼ E., distant 65 miles, 85–90 fathoms; Cape Seal N. × W. ½ W., 55 miles, 87 fathoms; Cape St. Francis NE. 29 miles, 75 fathoms; Glendower Beacon (Port Alfred area) N. ½ W., 16 miles, 66 fathoms, one dead (S. Afr. Mus. P.F. coll.).

Remarks. The *Pieter Faure* obtained 10 specimens. The Type and three others (seen by Tomlin, now in S. Afr. Mus.) have their opercula, but Tomlin made no mention of having extracted and examined a radula. Fortunately there is one other shell containing the animal.

Columbarium natalense Tomlin

1925. Tomlin. loc. cit., p. 331, pl. 25, fig. 2.

Protoconch 2 whorls, smooth, median keel faintly indicated on last half whorl, alt. 1·3, diam. 1·25 mm. Postnatal whorls 6½. Peripheral keel on 1st whorl very feebly undulate, on 2nd 10 feeble undulations, on 3rd 11 distinct lobes, on 4th the lobes beginning to be spiniform, on 5th and 6th whorls 12 more or less hollow spiniform, up-turned lobes.

Cape Natal (Durban) W. ¾ N. distant 12 miles, 85 fathoms (S. Afr. Mus. P.F. coll.).

Remarks. Only one dead specimen was obtained, now in S. Afr. Museum.

The irregularity of the axial threads is due, not to abrasion as Tomlin's description might suggest, but to irregularities of growth; the shell is not at all abraded, though the outer margin of the canal is broken just below the aperture.

As Tomlin remarked, distinctly resembling *canaliculatum* von Martens from the Zanzibar channel, 400 metres.